THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LIX. No. 1507.] LONDON, MARCH 29, 1892. [44TH YEAR. PRICE 6d.

WOLSTON'S Paste and Ready Mixed for Use.

Guaranteed Free from Adulteration. **TORBAY PAINTS.**

FOR GASHOLDERS, &c., &c.

The Original "Torbay Paints"
As supplied during the present and many preceding years to the LONDON GASLIGHT & COKE COMPANY.

Special Quotations to Gas Companies.

TORBAY & DART PAINT Co., Ld.,
DARTMOUTH, DEVON,
EXPORT OFFICE, SUFFOLK HOUSE, E.C.

— ESTABLISHED 1830. —
PARKER & LESTER,
Manufacturers & Contractors.

THE ONLY MAKERS OF
PATENT ANTIMONY PAINT,
Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores for Gas and Water Works.

WORKS:
ORMSIDE STREET, OLD KENT ROAD, LONDON.

Ashmore, Benson, Pease, & Co., Ld.,
STOCKTON-ON-TEES,
Manufacturing Gas Engineers.
See Advertisement, p. 565.

CEMENT
EARLE'S
BEST
Portland Cement
MANUFACTURED BY
GEO. & THOS. EARLE,
HULL.

Offices: 7, 8, & 9, PIER STREET.
Works: WILMINGTON.
STOREAGE CAPACITY 10,000 Tons.

ESTABLISHED 1811—OVER THREE QUARTERS OF A CENTURY.
Telegraphic Address: "CEMENT HULL."

INCLINED RETORTS,
FIRE BRICKS,
LUMPS, TILES,
BLOCKS, &c.
Special Bricks for Intense Heats.

GAS RETORTS.

CASTINGS AND EVERY REQUISITE FOR GAS-WORKS.

MOBBERLEY & PERRY,
Fire-Brick Works, STOURBRIDGE.
☞ Retort Setters sent to any part of the Kingdom.

SELF-CONTAINED DUST-FUEL FURNACE.
MELDRUM'S PATENT.

Extract from the *Smethwick Telephone*, June 13, 1891.

GAS COMMITTEE.

"The Manager [B. W. Smith, Esq.] reported that the adoption of MELDRUM'S PATENT FURNACES, he estimated, had resulted in a saving of 150 tons of Slack during the nine months they had been at work in the Boiler-House, and 360 tons of Slack during four months in the Retort-House; the fuel used in place of slack being the fine coke dust which formerly had to be carted or boated away at considerable expense."

MELDRUM BROS., Engineers,
ATLANTIC WORKS, 13, CITY ROAD, MANCHESTER.

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER & BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM

(ESTABLISHED 1765).

MANUFACTURER OF TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST IRON TANKS FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,

Wrought-Iron Roofs, Bridges, Girders, &c.,

Steam, Hot Water, and Range Boilers, Tanks, Cisterns, Boats, and all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES SUPPLIED ON APPLICATION.

TELEGRAPHIC ADDRESS: "COCKEY'S FROME."

EDWARD COCKEY & SONS, Ld.,

ESTABLISHED OVER HALF A CENTURY.

Gas Engineers and Contractors for the Erection of Gas-Works.

MANUFACTURERS OF IMPROVED GAS-EXHAUSTING APPARATUS.

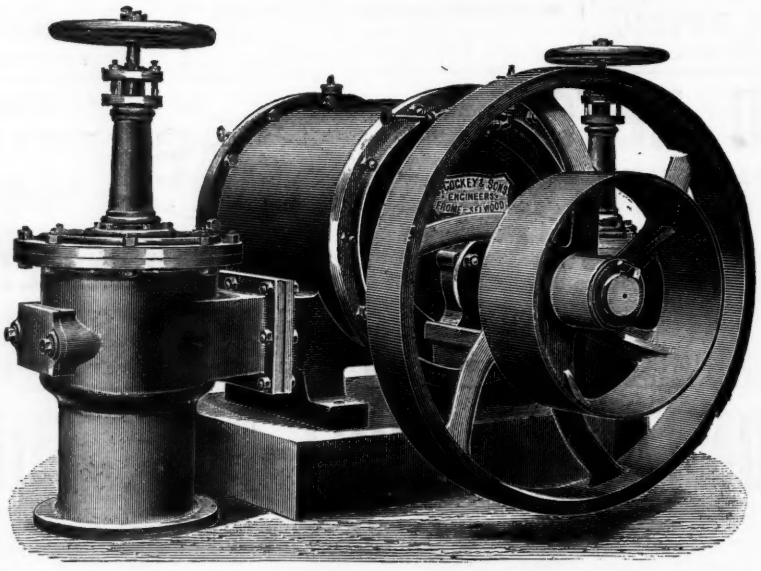
A Large Stock of Valves always on hand.

Lamp Columns; various patterns.

Wood Grids for Purifiers and Scrubbers.

Castings of every description.

Apparatus for the manufacture of Sulphate of Ammonia.



Experienced Retort-Setters constantly employed.

Lead Burning and Plumbing in all its Branches.

Gas-Fittings in great variety.

Brass Castings.

Patent Washers and Valves.

Boilers and Engines.

THE IRON-WORKS, FROME SELWOOD, SOMERSET.

HIGHEST AWARDS—LONDON, PARIS, COLOGNE, VIENNA, MELBOURNE, AND OTHERS.

—11 MEDALS.—

MANUFACTURERS OF TUBES AND FITTINGS OF EVERY DESCRIPTION.

WROUGHT-IRON OR STEEL MAINS UP TO 6 FEET DIAMETER, FOR GAS, WATER, OIL, OR OTHER PURPOSES.

SCREWING TACKLE, BOILER MOUNTINGS, VALVES, COCKS, ETC.

LONDON: 108, Southwark Street.

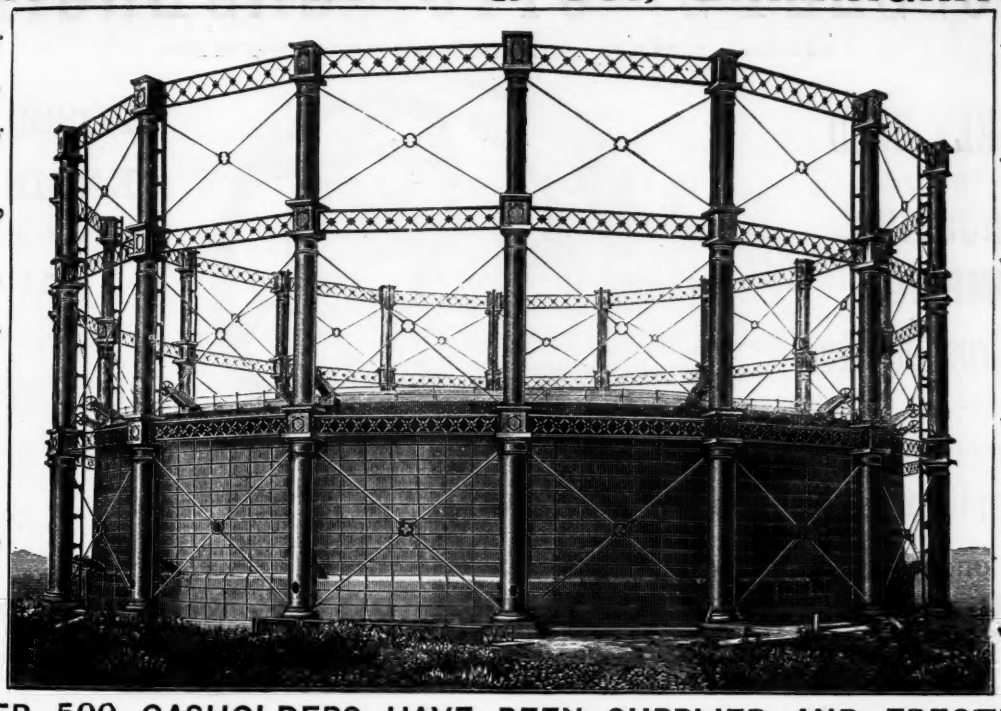
BIRMINGHAM: 114, Colmore Row.

LEEDS: 6, Mark Lane, New Briggate.

THOMAS PIGGOTT & CO., BIRMINGHAM.

LONDON OFFICE: ST. THOMAS APOSTLE, E.C.

GAS PLANTS, BOILERS, ENGINES, PUMPS, ROOFS, RETORT FITTINGS, ETC.



TELEGRAPHIC ADDRESS: ATLAS, BIRMINGHAM.

WELDED & RIVETED PIPES, FOUL MAINS, RETORT LIDS, WROT & CAST TANKS, PURIFIERS.

OVER 500 GASHOLDERS HAVE BEEN SUPPLIED AND ERECTED,

INCLUDING THOSE SUPPLIED TO THE FOLLOWING GAS COMPANIES AND CORPORATIONS:

BATH.	BOLTON.	BRISTOL.	CHELTENHAM.	LEAMINGTON.	PRESTON.	SHEFFIELD.
BELFAST.	BOMBAY.	BRISBANE.	HARTLEPOOL.	LIVERPOOL.	READING.	STOCKHOLM.
BECKTON.	BRADFORD.	CARDIFF.	LEEDS.	NOTTINGHAM.	RIO GRANDE.	SYDNEY.
BIRMINGHAM.	BRIGHTON.	COVENTRY.	LEICESTER.	OLDHAM.	SOUTH METRON.	VIENNA.

GAS COAL.

BEST

REAL OLD SILKSTONE GAS COAL,

Address THE STRAFFORD COLLIERIES COMPANY,

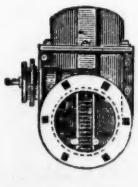
Near BARNSLEY, SOUTH YORKSHIRE.

NEWTON, CHAMBERS, & CO., LIMITED

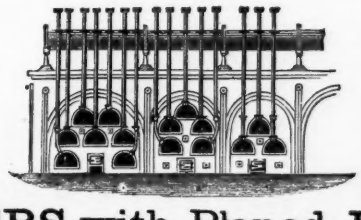
THORNCLIFFE IRON-WORKS, near SHEFFIELD,

MANUFACTURERS OF

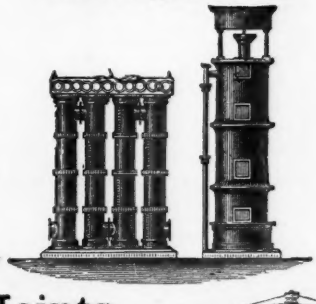
SLIDE VALVES,
WITH RACK & PINION,
OR
Internal or External SCREWS, of all Sizes.
GASHOLDERS,
AND
Gasholder Tanks.



CAST-IRON RETORTS,
RETORT-BED FITTINGS,
And Retort-House Appliances
of every description.
Iron Roofs, Columns, Girders, Floor Plates and Tools, &c.

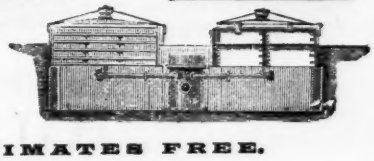


WROUGHT AND CAST IRON
CONDENSERS,
SCRUBBERS, & WASHERS,
TAR AND LIQUOR PUMPS, &c.



PATENT
CENTRE VALVES
for working Purifiers.
Also Bye-Pass & Stop Valves.

PURIFIERS with Planed Joints,
HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS and SPECIALS,
WOOD GRIDS.
CAST AND WROUGHT IRON TANKS AND CISTERNS.



DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

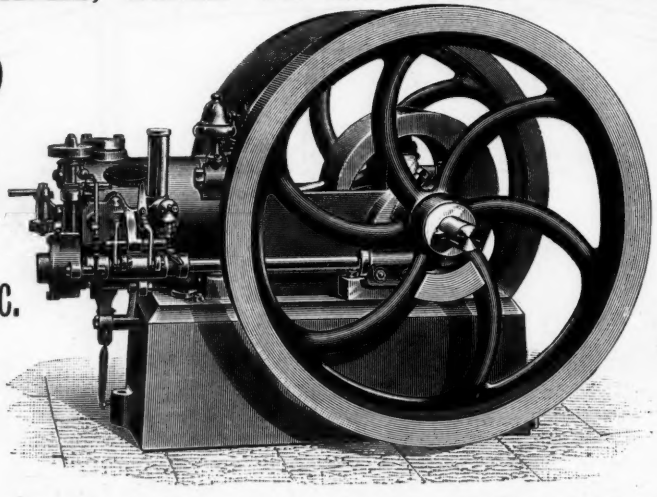
GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

CROSSLEY'S "OTTO" GAS-ENGINE.

SIZES, 2-MAN TO 200-HORSE POWER.

LARGELY USED
FOR
EXHAUSTING,
PUMPING,
Coke Crushing, &c.

Reduced Prices on Application.



CROSSLEY'S ENGINES,
Combined with
PUMPS
FOR
TOWNS' SUPPLY,
SEWAGE,
&c., &c.

CROSSLEY'S NEW HIGH-SPEED ENGINE FOR DIRECT ELECTRIC LIGHTING.

CROSSLEY BROS., LTD., OPENSHAW, MANCHESTER,

THE LARGEST MANUFACTURERS OF GAS-ENGINES IN THE WORLD.

HARRIS & PEARSON,
STOURBRIDGE, ENGLAND.
MANUFACTURERS OF
FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.
GLAZED BRICKS AND PORCELAIN BATHS.

W. C. HOLMES & CO.,

CONTRACTING GAS ENGINEERS.

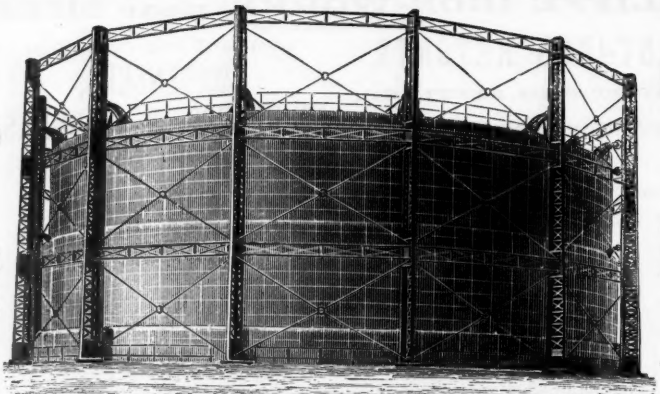
THE
PATENT ROTARY
Scrubber-Washer,
With recent improvements.

Sizes from 50,000 to 5,000,000 feet per day.

Guaranteed larger area of wetted surface, size for size, than that of any other Maker.

RESULTS UNAPPROACHED BY ANY OTHER SYSTEM.

Send for References.



Single, Double, Treble, and Four-lift Gasholders of all Sizes.

"Saville's" Patent
COMBINED EXHAUST REGULATOR & TAR EXTRACTOR,

Perfectly automatic, and cannot get out of order. Prices low. All particulars on application.

Retort-Settings, Condensers, Scrubbers, Purifiers, and all Fittings for Gas-Works.

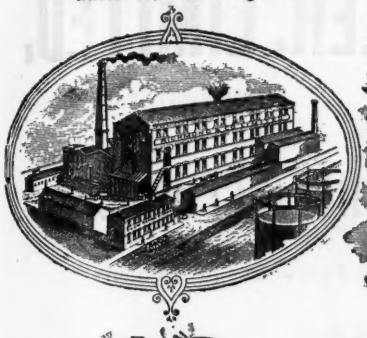
WHITESTONE IRON-WORKS,
HUDDERSFIELD,
AND
80, CANNON STREET, LONDON, E.C.

For Telegrams: "Holmes Huddersfield."

For Cablegrams: "Ignitor London."

Telegrams:
"Gastoves," Warrington.

TEMPORARY LONDON OFFICES & SHOW-ROOMS: 65 & 66, BASINGHALL STREET, E.C.
Winners Nelson Test, June 2, 1891; Nottingham Medal, Nov. 28, 1891.



GAS COOKING RANGES
GAS FIRES
Heating Stoves
WATER HEATERS
BOILING BURNERS
Richmond & Co. Limited
GAS ENGINEERS

WARRINGTON & LONDON.

E. W. T. Richmond, Managing Director. Sole Agents for Webb's Lamps.

No. 120.

THE "MODEL" RANGE.

Acknowledged to be the Best and Cheapest Cooker in the Market.

WITH WHITE ENAMELLED CROWN PLATE. *RICHMOND'S PATENT.*	No. 30.	No. 40.	No. 50.	No. 100.	No. 120.	No. 140.	No. 160.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
	3 7 0	4 2 6	4 12 6	5 18 0	7 3 6	9 4 0	13 5 0

CLOTH CASES

FOR

BINDING SUBSCRIBERS' VOLUMES OF THE "JOURNAL"

CAN BE HAD OF THE PUBLISHER.

Price 2s. each.

ASHMORE, BENSON, PEASE, & CO., LIMITED,

STOCKTON-ON-TEES.

MAKERS, PATENTEES, AND ERECTORS IN ALL PARTS OF THE WORLD.

GASHOLDERS. (*a*) Large or small, with Wrought-Iron Standards, or Cast-Iron Columns.

(*b*) Guided by Pease's Wire Ropes. Ask Price and inspect those already at work. Full guarantee given.

(*c*) Cast or Wrought Iron Tanks.

Drawings and Designs for all sizes always in stock.

PURIFIERS. On the most modern system, with all kinds of Lifting Gear.

SCRUBBERS & WASHERS. Tower, with Canvas Screens.

New Mechanical Radial Washer-Scrubber, entirely new in principle and supersedes all others.

CONDENSERS. Any capacity, Cast or Wrought, Tubular or Annular.

HYDRAULIC MAINS and RETORT-FITTINGS of every description.

RESIDUAL-RECOVERY PLANT. The most perfect Ammonia Still yet designed. New patent Saturator, entirely mechanical. Cyanide-recovery Plant.

KIRKHAM, HULETT, & CHANDLER, LIMITED.

[SIDNEY HERSEY, Managing Director.] [J. CHANDLER, Engineer.]

443 Patent "Standard" Washer-Scrubbers,

Capable of extracting the whole of the Ammonia from 422,310,000 Cubic Feet of Gas per 24 hours,

Erected and in course of construction at present date.

ORDERS RECENTLY RECEIVED FOR:—

Two Patent "STANDARD" Washer-Scrubbers, each for 3,500,000 cubic feet of Gas per 24 hours, for the BECKTON STATION of THE GASLIGHT AND COKE COMPANY.

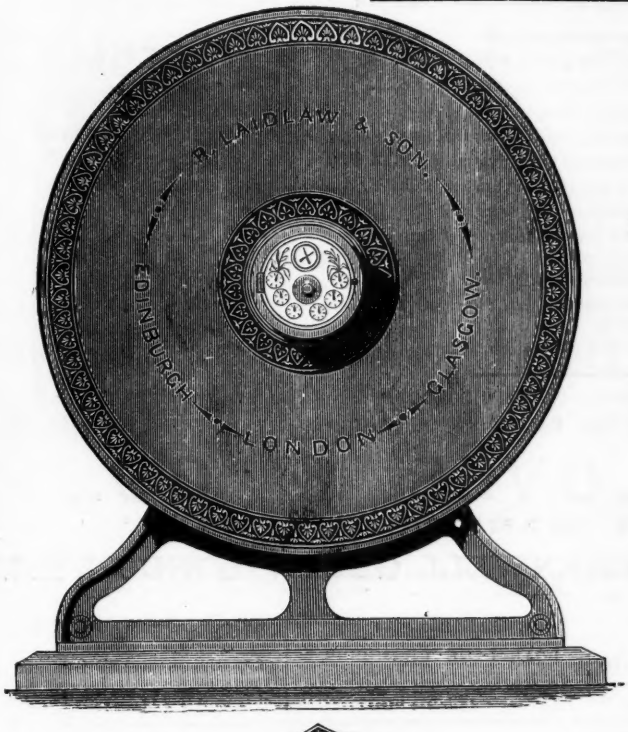
One Patent "STANDARD" Washer-Scrubber for 3,000,000 cubic feet per 24 hours for the CROYDON GAS COMPANY.

Two Patent "STANDARD" Washer-Scrubbers, each for 3,000,000 cubic feet per 24 hours, for the PARIS GAS COMPANY.

All New Patent "Standard" Washer-Scrubbers are fitted with the Company's Patent Improved Wooden "Bundles" or Washing devices, which can be readily fitted to old pattern Machines.

Address: 3 & 4, Palace Chambers, Bridge St., Westminster, London, S.W.

R. LAIDLAW & SON'S
STATION METERS
IN ROUND OR SQUARE CASES, ALL SIZES.

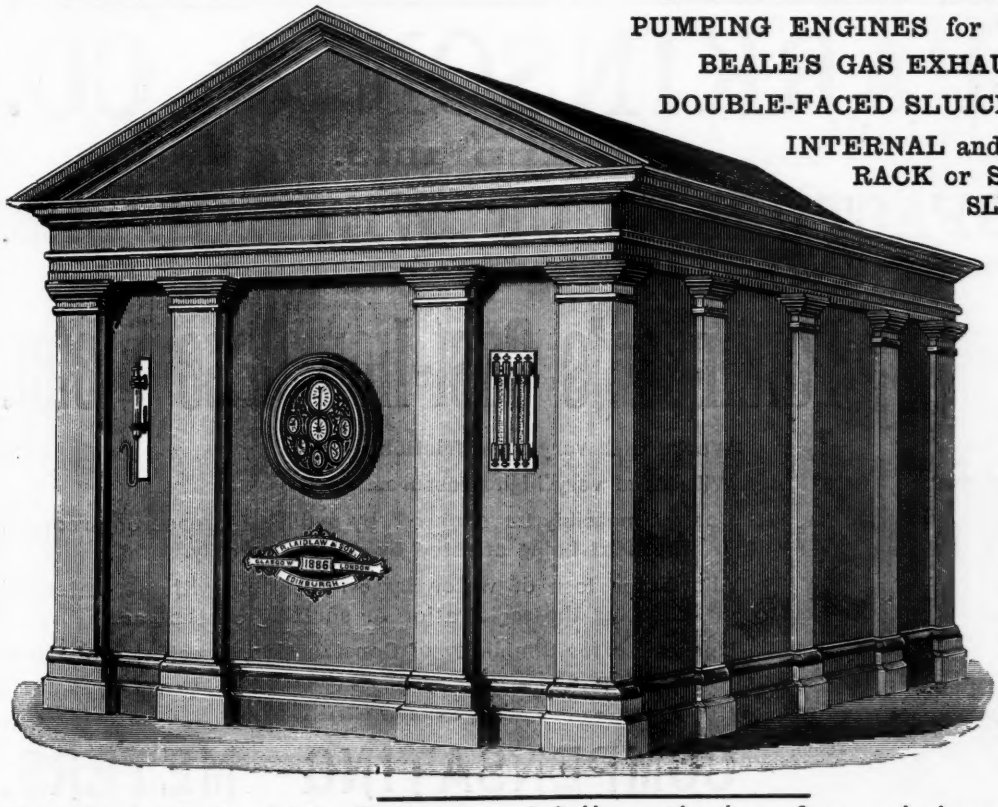


Makers in EDINBURGH of

WET AND DRY GAS-METERS,
IMPROVED STATION GOVERNORS,
PRESSURE REGISTERS,
To Indicate New Time),
PRESSURE GAUGES, TEST HOLDERS,
EXPERIMENTAL HOURLY-RATE METERS,
EXPERIMENTAL TEST-METERS,
CONDENSER THERMOMETERS,
SIEMENS' WATER-METERS,
STREET LANTERNS,
AND ALL KINDS OF
GAS APPARATUS AND FITTINGS, &c.

Makers in GLASGOW of

CAST-IRON PIPES (all Sizes),
LAMP PILLARS,
STEAM-ENGINES AND BOILERS,
PUMPING ENGINES for Water-Works,
BEALE'S GAS EXHAUSTERS,
DOUBLE-FACED SLUICE VALVES,
INTERNAL and EXTERNAL RACK or SCREW SLIDE VALVES,
CAST-IRON COLUMNS,
BEAMS, GIRDERS, and WATER TANKS.
WROUGHT-IRON TUBES, FITTINGS, &c.



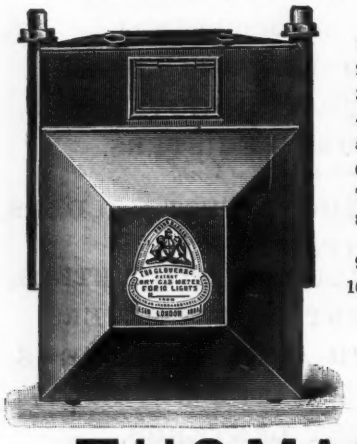
Descriptive Price Lists, Estimates, & full particulars forwarded on application.

ALLIANCE FOUNDRY, **GLASGOW.** | SIMON SQUARE WORKS, **EDINBURGH.** | 6, LITTLE BUSH LANE, **LONDON, E.C.**

[ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;
The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.



1st.—Are a remedy for all the defects of Wet Meters.
2nd.—Are suitable for all Climates, whether hot or cold.
3rd.—Incur no loss of Gas by Evaporation.
4th.—Cannot become fixed by Frost, however severe.
5th.—Are the most accurate and unvarying measurers of Gas.
6th.—Prevent jumping or unexpected extinction of the Lights.
7th.—May be fixed either above or below the level of the Lights.
8th.—Cannot be tampered with without visibly damaging the outer case.
9th.—Will last much longer than Wet Meters.
10th.—Will not cost more than one-half for repair that Wet or Water Meters do.

Are upheld for five years without charge.

Telegraphic Address: "GOTHIC LONDON."
Telephone No. 6725.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

BRISTOL: 62, VICTORIA STREET. *Telegraphic Address: "GOTHIC."*

BIRMINGHAM: 3, BRIDGE ROW, DERITEND. *Telegraphic Address: "GOTHIC."*

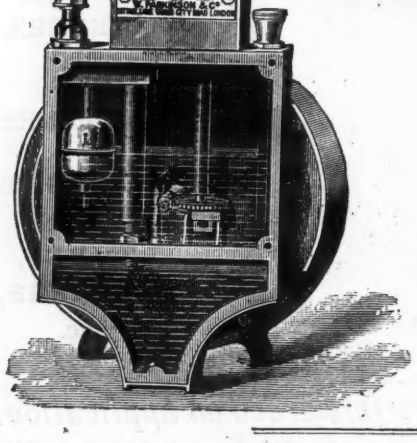
LEEDS: BOAR LANE CHAMBERS, 4, BASINGHALL STREET. *Telegraphic Address: "GOTHIC."*

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address: "GOTHIC."*

W. PARKINSON & CO.

ESTABLISHED 1816.

MANUFACTURERS OF WET METERS.



Parkinson's Cast-Iron Case Meter.

Works with very little friction.

Will stand very high pressures.

Cannot possibly be shut off by sudden increase of pressure; the float being affected by outlet gas only.

Allows for loss of water by evaporation without materially affecting the registration or shutting off the gas.

Unexcelled for Simplicity of Construction, Excellence of Workmanship, and Accuracy of Registration.

COMPENSATING METERS,

In Tinned or Cast-Iron Cases.

COTTAGE LANE WORKS, CITY ROAD, **LONDON.** Telegraphic Address: "INDEX."

BELL BARN ROAD WORKS, **BIRMINGHAM.** Telegraphic Address: "GAS-METERS."

OFFICE: 10, MAWSON'S CHAMBERS, DEANSGATE, **MANCHESTER.** Telegraphic Address: "PRECISION."

CONTENTS.

EDITORIAL NOTES:—

GAS, LIGHTING, &c.— PAGE

A Particular Aspect of Municipalism 569
The Commercial Report and Accounts 570
The Costs of the Chartered Assessment Appeals 570
The State of Private Bill Business 570
The Durham Coal Famine—German Gas Coal for London 571

ESSAYS, COMMENTARIES, AND REVIEWS:—

Gas and Water Companies in the Stock Market 571
Electric Lighting Memoranda 571
The Task of the Standards of Light Commission 572
Lewes on Air and Water 573

NOTES:—

Coke-Breeze Concrete 574
Test of a Locomotive-Type Boiler 574
Flared Coal Tar for Waterproofing 574
An Explosion Experiment in the Lecture-Room 574

COMMUNICATED ARTICLE:—

The Consumers' Interest in the Rating of Gas-Works. By Norton H. Humphrys, Assoc. M. Inst. C. E., F.C.S. 575

TECHNICAL RECORD:—

New England Association of Gas Managers—Annual Meeting at Boston . 576
Explosions caused by Coal Dust 577

REGISTER OF PATENTS:—

Gas Engines—Hughes, F.; communicated from F. Cordenous. 577
Gas Cooking and Heating Stove—Billing, C. E. 577
Prepayment Gas Meters—Cowan, W. 577
Gas Lighting and Extinguishing Apparatus—Adkins, W., and Melville, J. . 578
Gas-Fittings—Fairbank, J. 578
Electro-Magnetic Gas Controller—M'Laren, J. 578
Gas Retorts—Cotton, W. T., and Crowther, E. F. B. 578
Spreading Disc for Gas Burners—Ephraim, A. 579
Gas Engines—Pinkney, C. W. 579
Gas Motor Engines—Southall, J. 579
Water Gas Apparatus—Springer, T. G. 579
Patent Notices 580

CORRESPONDENCE:—

The Standard of Light 580
Regulating the Seal in, and Drawing the Tar from, Hydraulic Mains . 580
The Action of Gasholder-Tank Water upon Cement 580
Fourness's Gas Patents 580

PARLIAMENTARY INTELLIGENCE:—

House of Lords—Progress of Bills 581
House of Commons—Progress of Bills 581
House of Lords Committee—Barrow-in-Furness Corporation Water Bill; Bradford Corporation Water Bill 581
House of Commons Committee—London County Council (Subways) Bill 582

LEGAL INTELLIGENCE:—

Supreme Court of Judicature—Court of Appeal—The Staffordshire Gas and Coke Company, Limited, and the Companies' Acts. 584
County of London Assessment Sessions—The Gaslight and Coke Company's Assessment Appeals 584
Newcastle Assizes—Mayor and Corporation of Tynemouth *v.* North Shields Water-Works Company 585

MISCELLANEOUS:—

Commercial Gas Company—The Half-Yearly Report and Accounts . . 586
Alliance and Dublin Consumers' Gas Company 586
Meeting of the Ottoman Gas Company, Limited 586
Colonial Gas Undertakings 588
The Durham Miners' Strike and the Supply of Gas Coal to London . . 588
The Stoke-upon-Trent Gas Undertaking—The Finances of the Gas Department 589
The Taunton Town Council and Electric Lighting 589
The Public Lighting and Roads of Kensington 590
Metropolis Water Supply—The Quality of the Water in February . . . 591
Liverpool Corporation Water Supply—Completion of the Boring of the Mersey Tunnel 591
Plymouth Corporation Water Supply—A New Storeage Reservoir; Water Power for Electrical Purposes 591
Notes from Scotland 592
Current Sales of Gas Products 592
Coal Trade Reports 592
Gas and Water Companies' Stock and Share List 593

PARAGRAPHS.—Messrs. James Milne and Son, Limited, 571—Mr. R. J. Jenkins, C.E., 573—The City Gas Examinership, 573—Mr. S. Hesketh, 573—The Liberty and Property Defence League, 574—The Murdoch Memorial, 574—Sad Death of a Water Engineer, 574—Annealing in Coal Gas, 574—The Royal Commission on Water Supply, 575—Rainfall Statistics, 575—The Purchase of the Rhyl Gas-Works by the Commissioners, 580—Armagh Gas Company, 580—Sales of Shares, 580—The Committee on the Birmingham Corporation Water Bill, 584—The Swinton and Pendlebury Local Board Bill, 584—Oldbury Local Board Gas Department, 584—Bangor (Co. Down) Water and Gas Supply, 586—New Water-Works for Bude and Stratton, 586—Sheppy Gas Company, 586—The "Electric Fires" in Liverpool, 588—Gas in Japan, 589—Thirsk Gas Company, 590—New Joint-Stock Company, 590—Tynemouth Gas Company, 591—Bristol Water Company, 591—Steam-Rollers and Gas-Mains, 593—Dorking Gas Company, 593—Celebration of the Third Anniversary of the Gas Workers' Union, 593—Ammonia Gas Purifying and Alkali Company, Limited, 593—Electric Lighting for Cambridge, 593—Southend Gas Company, 593—The Vyrnwy Water and Lead-Poisoning, 593—Gas Exhibitions, 593—Completion of New Water-Works for Padiham, 594—Water Affairs at Loughborough, 594—The Acquisition of the Calverley District Water Company by Local Authorities, 594.

THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MARCH 29, 1892.

A Particular Aspect of Municipalism.

FOLLOWING up the subject of our first leading article of last week, we notice that, upon the initiative of Lord Rosebery, a Special Committee of the London County Council has been appointed to consider the subject of the organization of the whole body for detail work. It will be worth while for members of other and older local governing authorities to keep an eye upon the outcome of this inquiry, which is of particular interest wherever bodies of this character, with their perpetual changes of membership, have to administer permanent undertakings such as gas supply. It is to be supposed, of course, that the County Council Committee will put themselves into communication with municipalities all over the country, and perhaps abroad, with the object of collecting information as to how responsibilities of this kind are actually borne at present; but it by no means follows that they will recommend that any existing practice shall be implicitly followed. The London County Council are so large a body, and so peculiarly circumstanced, that they will, in all probability, strike out a new method of doing their detail and routine work.

What is imperatively needed, in the case of a shifting body with permanent responsibilities, is some administrative device for ensuring a reasonable continuity in their external policy. It would obviously be destructive of financial credit and executive discipline if the whole principle of administration of an important county or municipal authority were subject to alteration at any general election, or by a "snap" division in the body itself. Changes, of course, there must be, as time goes on; but it is eminently desirable that these should be gradual, regular, and natural. In the actual municipal organizations of England, there is no formal provision for ensuring continuity of executive policy other than such as may be deduced from the permanence of the aldermen, who naturally perpetuate the traditions of the old order, and compel the due consideration of all proposed innovations. Subject to this aldermanic influence, the management of water and gas supply, and of other permanent undertakings, is, in the English municipal system, a function of committees of the local authority—apparently the most changeable of bodies. In Scotland these things are ordered differently, more or less stable Boards of Commissioners, charged with definite responsibilities, being preferred in most instances to the English system of "scratch" committees. The same remark holds good for Ireland.

It is plain that the newest-made local authorities, such as the London County Council, are more directly subject to the popular voice than the older organizations. Their constitution is more democratic. They are consequently more likely to fall under the seduction of the idea that "to the victors belong the spoils"—not, we are happy to think, in the bad sense attached to this phrase across the Atlantic, but in the general application of the principles, crotchets, and notions of the victorious party of a general election to all the offices and work of the organization. General elections are won upon all sorts of cries; and—the possibility of corruption apart—it is clearly desirable that there should be some better guarantee for continuity of policy than serves for a gradually-changed corporation, in the case of an elective authority subject to frequent dissolution and reconstruction. High officials in permanent employment constitute a powerful conservative force in the working of a shifting body; but an officer-ridden authority is not entitled to respect. We are the firmest and most insistent of advocates for the honourable and liberal treatment of officers of municipalities and companies; but they have their proper place, which is altogether different from that of the superior authority whose counsels it is their duty to carry out to the best possible effect.

The question comes to this: Supposing a new local authority, constructed upon the most democratic lines, to be entrusted with the discharge of certain permanent responsibilities, such as the supply of gas or water, the care of the highways, the finances of a district, &c., what would be the best way to organize the departmental control? Should this be done by committees, by commissioners, by paid administrators filling the place of company directors, or how? This is by no means an easy problem to solve. In regard to gas supply, directors of gas companies are paid, and members of gas committees of corporations are not paid; and there are good and bad administrators of both orders. There is greater executive force in a board of directors than there is in most corporation committees; but it is an open question which can do more mischief when badly constituted. Although a committee is answerable to the whole body of the council, whereas in practice directors are afraid of nobody, the worst of it is that, when corporations overrule their committees, it is generally for the worse. It is fair matter for argument whether, in place of the loosely-organized and little-instructed committees of municipal corporations,

it would not be better to administer such undertakings as gas or water works through small commissions, the head of which (under the Mayor) should be paid for his work. Something in this direction has already been adopted in the case of the London County Council, the Deputy-Chairman of which receives a respectable, but not an excessive, salary. In the old Metropolitan Board of Works it was the Chairman who was paid; but this arrangement was not the best conceivable, because there was nobody to overlook the paid representative of the Board, who was consequently able to do pretty much as he liked. At any rate, it appears to be a more reasonable and hopeful idea to pay the real working administrators of a Council or a Corporation, while keeping them subordinate to the official head, than to pay either the head or the general body of members—which latter, be it observed, is equally a question of the day. Upon all these matters, it is to be expected that more will be heard in future.

The Commercial Report and Accounts.

THE report of the Directors and the statement of accounts relating to the past half-year's working of the Commercial Gas Company have been issued, and will be found in another column; the ordinary general meeting of the shareholders being fixed for Friday next. The half year has again turned out badly; the revenue account showing a net profit of only £27,666, as compared with £38,760 made during the corresponding period of 1890, and exhibiting a further, although slight, falling off as compared with the immediately preceding half year. Dividends after the rate of 13 and 10 per cent. upon the Company's old and new stock respectively are recommended, payment of which will reduce the undivided balance to £18,494. Further capital being required, the Directors have resolved to issue the £35,000 of debenture stock already authorized to be raised; and, in the circumstances, it is not to be wondered at that the price of gas is, after all, to be increased to 2s. 6d. per 1000 cubic feet. It is to be hoped that this small increase will meet the necessities of the case; but it must be borne in mind that it will only come into operation for the summer quarters, and cannot therefore do the Company so much good as it would have done if the resolution had been acted upon at Christmastide. The Commercial Directors deserve sympathy for their evident desire to hold on as long as possible without raising their charge; and it must be admitted that, even with their gas selling as it now does at the rate of 2s. 6d. per 1000 cubic feet, they supply a remarkable commentary upon Colonel Makins's *dictum*, that the price of gas north of the Thames must be expected to be at least 3d. per 1000 cubic feet in excess of the prevailing rate across the river. As is customary with this Company, the Directors' report does not offer any explanation of the condition of the undertaking. It is to be feared that when the Chairman (Mr. J. Blacket Gill) essays this task on Friday, he will hardly be more cheerful over it than he was when he made his last appearance before the Commercial proprietors. It is true that the gas-rental has increased from £120,133 to £124,946, which is something to be thankful for; as is the corresponding increase of meter and stove rental from £2466 to £2647—the difference meaning practically many new consumers. The expansion of business is also shown in the increase of gas sold by just over 4 per cent. Here, however, satisfaction must stop. Residuals have dropped from £55,625 to £45,898. Most of this depreciation is in the coke sales; for sulphate even shows an improvement. On breeze, however, there has been an actual loss of £155. Moreover, the labour upon both coke and breeze cost more than when these commodities were more profitable. The gross effect of these altered values is that the total revenue has fallen from £178,275 to £173,668. On the other side of the account, we find the cost of manufacture risen from £117,284 to £125,132. Every item shows an increase; but the heaviest additions are, as might be supposed, for coal and labour. The weight of coal and cannel carbonized rose from 109,862 to 115,132 tons, or by nearly 4·8 per cent.; while the cost of it rose from £79,611 to £84,997, or by 6·7 per cent., and the cost of handling it increased from £18,546 to £20,160, or by as much as 8·7 per cent. The last figure illustrates painfully the effect of the combined influence of the Gas Workers' and the Coal Porters' Unions upon the manufacture of gas. A saving of £1720 has been secured under the heading of "distribution," by cutting down the repairs account. Altogether, the expenditure shows a rise from £139,515 to £146,001, with regard to which the proprietors are entitled to full and particular explanation. Nobody, of course, would wish to be hard upon the Directors in respect of the difficulties that have come upon them from without, among which dear coal is the most serious. It is obvious, however, especially in view of the issue of their extraordinary circular to their consumers, that it should be made known who is really responsible for the conduct of the Company's business, and the performance of their duty to the public. There must be something very wrong with any gas company to account for the directors issuing an appeal to their customers not to burn more gas than they can help. Such is, at any rate, the impression which the average man would receive from the recent proceeding of the Commercial Board. If Mr. Gill can put a different aspect upon this questionable affair, the friends of the gas industry in general will be greatly obliged to him.

The Costs of the Chartered Assessment Appeals.

IT was stated, in the course of the last day's proceedings in the great assessment appeal of The Gaslight and Coke Company, that the costs of this long litigation amount to £30,000, which must be a figure well within the mark, even of the taxed costs, to say nothing of the costs as between solicitor and client. It is not often that one hears the leading Counsel in a lawsuit speak fearfully of the expenses of the action; but this has been done repeatedly in the instance of this appeal, and the last few days' arguments bore exclusively upon this subject. The appellants for some time allowed it to be clearly seen that they thought themselves hardly dealt with by the Court; but when the result could no more be varied, and it became perfectly clear that the winning side would have the best of it in the matter of costs, they soon changed their tune, and claimed to have won in every instance where they had reduced their assessment by ever so little. Briefly stated, Mr. Littler's argument with a view to getting his costs was this: "We "were compelled to appeal as the only means of avoiding "payment under what we considered as an exorbitant "assessment. The Court reduces this assessment by "£40,000 or thereabouts; which is our justification. "*Ergo* we win, and the respondents should be cast in "costs." The other side say: "Not so. If the assess-"ment was too high by £40,000, your offer was too low "by nearly £210,000; and so you are five times as much in "error as we were. Moreover, all this might have been "spared if you had come before the Assessment Com-"mittees with more reasonable figures, between which "and ours there might have been some compromise." There are two sides to every question; and it is not for us to say in the present case which is the more reasonable view of the facts. The lawyers, at any rate, are fairly well satisfied with the result.

The State of Private Bill Business.

THE Private Bill business at Westminster has been very brisk during the past week. The opposition to the Oxford Gas Company's Bill was withdrawn, and this measure will therefore go forward quietly in due course. The Bill of the Liverpool United Gas Company now meets the wishes of the Corporation; and therefore it has been passed by the Chairman of Committees as an unopposed measure. The Swinton and Pendlebury Local Board Bill, which was promoted by the Local Authorities interested in giving practical effect to the provisions of the Salford Gas Act of last year, enabling certain outlying districts to supply themselves with gas, passed the Lords' Committee. The evidence in this case, a report of which will be given in the JOURNAL next week, should be carefully read by everybody who may be disposed to believe, upon general principles, that the control of gas supply by local authorities necessarily gives general satisfaction. Many eminent professional men were engaged upon this Bill, the preamble of which was eventually declared to have been proved, with the modification that Eccles, Barton, and Little Hulton were cut out from the proposed Swinton district. The Southend Gas Bill was also considered last week, the opposition in this case being apparently inspired by the usual town's jealousy of a rising Company. The Subways Bill promoted by the London County Council has been in Committee; and the

differences which arose between the Council and some of the parties affected by the measure, including the Gas and Water Companies, have not yet been satisfactorily disposed of. The Government have made progress with the Bill for altering Private Bill procedure for Scotland, to which country its operation is now restricted. This has always appeared to us to be an uncalled-for piece of tinkering with the general question, seeing that the amount of Private Bill business that comes to Westminster from Scotland is very small; and it is difficult to believe that the gentlemen whose duty calls them south to look after it take this necessity as a hardship. The reform, such as it is, will probably be carried out, however; and it will at least serve to throw some light upon the question as to whether any further system of devolution is practicable or desirable in regard to Private Bill Legislation.

The Durham Coal Famine—German Gas Coal for London.

THE question of coal, as it was presented to the country last week, was prettily complicated in several respects. We had the dupes of the Federation so far persuaded of the failure of their grand "play-week" experiment as to go to work wherever the owners of pits would allow mining to be resumed. On the other hand, the Durham miners persisted in following out their own quarrel with their bread-and-butter; emphasizing their independence, as usual, with violence and riot. Meanwhile, the working of economical laws was exemplified by the importation of Scotch coal into the Hartlepools, and by the purchase of an experimental cargo of Westphalian gas coal by the South Metropolitan Gas Company. As may be supposed, the latter incident attracted a good deal of notice; and Mr. Frank Livesey, the Chief Engineer of the Company, was promptly interviewed, on the transaction getting into print, by representatives of the newspapers. Mr. Livesey's explanation was very much to the point, and contained several things for leaders of the New Unionism and their supporters in the Press to think about. He declared that Durham coal is the best all-round gas coal that comes into the Thames; and so long as he can get it at a reasonable figure, he will be content therewith. But if the miners indulge in "play" to such an extent as to imperil the coal supply of the Company which lights the larger part of South London, those who are responsible for this lighting will go elsewhere for the necessary raw material. The South Metropolitan Company can do this without consulting the leaders of any Union; being free from all this kind of coercion, and able to manage their business in their own way. This news is, of course, what Mr. Richard Swiveller would call a "staggerer" for the unionists. The Commercial Gas Company had "taken it lying down;" and although the Federation blunder had only resulted in enriching a few coal merchants, the believers in the omnipotence of the British workman still hoped that the Durham men might have succeeded in making a few more gas directors uncomfortable. Once more, however, it has appeared that the South Metropolitan Board are inclined to "take it fighting;" and the consequent dismay in the unionist camp is ludicrously abject. It is significant of the weakness of the journalistic applauders of the Unions that they can only chronicle this bold proceeding on the part of the South Metropolitan management; they do not attempt to criticize the policy of independence which it signalizes. It is only fair to Mr. Frank Livesey to state that he does not seek to pose as a defier of the Unions, a vindicator of the liberty of trading, or anything of the kind. Everyone who knows him needs no further assurance that self-advertisement of this sort is wholly foreign to the nature of this most retiring of gas-works administrators. When Mr. Livesey tells the newspaper reporters that the purchase of German coal is only an experiment, and when he uses language deprecating the ascription of undue importance to the incident, he is to be taken as absolutely candid and sincere. But this mild-spoken gentleman is also perfectly sincere in stating that he has no fear of "coalies," or of any other unionists; and it is this that makes his actions so terribly interesting to the whole tribe of the latter.

Messrs. James Milne and Son, Limited.—The well-known firm of Messrs. James Milne and Son, of Edinburgh, has been converted into a limited liability Company, with a capital of £75,000 in £10 shares, and £25,000 in 4 per cent. debentures.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 593.)

BUSINESS in the Stock Markets was very quiet last week; and prices accordingly were inclined to drop for lack of support. Incidents were few. The Behring Sea affair was estimated at about its full value—viz., an election job. The silver question, however, is more serious. No financial nostrums will remedy it, though they may partially cover it; and nothing but the curative power of time will be effectual. The long nineteen day account, which seems to blow nobody any good, is at an end at last; and the settlement ought to go through without difficulty. Money has naturally been in better demand; but the outlook is unchanged. The Gas Market has been much more quiet—markedly so in comparison with the preceding week. The tendency, however, was quite favourable nevertheless. Changes in value are few in number, and moderate in degree; but they are all in the upward direction, and are almost restricted to the heavier issues. Gaslight "A" opened firm on Monday; and, advancing one point the next day, maintained its advance to the close, though prices actually marked were not quite so good as Monday's. A good deal more business was done in the other issues; and prices were very steady—the debenture stocks being about the firmest. South Metropolitan "B" was steadily dealt in at better than average figures; but the quotation did not move. A bargain in the "C," however, was marked at 240, and this sent the quotation up 3. Nothing was done in Commercials, except one deal in debenture. The Company's report and accounts for the past half year are out; and they exhibit that increase in expenditure and falling off in revenue to which the previously-issued accounts of numerous other Companies have familiarized our senses. With dear coal and labour, and with cheap gas and residuals, it is, of course, impossible to preserve an equilibrium; and the result is naturally a heavy balance on the wrong side. We are glad to see that the Company are raising their price. With this aid, with the reserves in hand, and (last but not least) with the prudent reduction of the rate of dividend, they may confidently await the returning swing of the pendulum bringing cheaper coal and a better demand for its products. The Suburban and Provincial Companies have been almost wholly neglected; and the only move is a rise of 2 in Brentford new. The Continentals were fairly active, all things considered, and steady. Imperial advanced 1. None of the rest presented any feature whatever; being quiet and unchanged. The Water Companies generally have made a further decline during the week; but there are symptoms of a revulsion setting in.

The daily operations were: The Gas Market opened well on Monday; and prices were favourable all round. Brentford new and Imperial Continental rose 1 each. In Water, Chelsea and Kent fell 5 each; and Lambeth, 2½. Gas was quieter on Tuesday; but prices still looked up, and Gaslight "A" rose 1. Wednesday was equally inactive; and the only feature was another rise of 1 in Brentford new. Water continued to fall. Kent dropped 5; Southwark, 3; Chelsea and Lambeth, 2½ each; and East London and West Middlesex, ½ each. On Thursday, the Gas Market underwent no change; but Water picked up a little—Lambeth being 2½ higher; and Southwark, 1. On Friday, Gas was very quiet, and presented nothing for remark. Water slightly relapsed; Southwark and Vauxhall and West Middlesex each receding 1. Gas continued quite featureless on Saturday; but in Water, Grand Junction rose 1½.

ELECTRIC LIGHTING MEMORANDA.

Increase of Capital by the Electric Construction Corporation—The Cheapest Electric Lighting on Record—The Westminster Electric Lighting Corporation—Electric Lighting Companies and Fires.

THE fact of the Electric Construction Corporation having resolved to increase their capital, by the issue of 7 per cent. preference shares, to the very respectable nominal amount of £750,000, is an incident of the contemporary development of the electrical industry not to be overlooked. It goes to support the evidence of the Crystal Palace exhibition, that there is a good deal of trade being done in this line, although the lighting branch is not turning out the gold mine it was expected to prove. The success, such as it is, of the Electric Construction Corporation, the Crompton Company, and other joint-stock ventures of the same order, is traceable mainly to the manufacturing business which they carry on. These firms require a large amount of capital, because they have to finance their best customers, as well as supply them with goods. Indeed, the inner history of the electric lighting enterprise of the present day is a marvellous tale of "wheels within wheels"—of complex reciprocal arrangements, and of liabilities borne by ingeniously managed suspense accounts until they could be deftly planted out among genuine investors. When all the skill and resources of the promoters, brokers, bankers, company solicitors, and money-spinners who constitute the modern world of finance are combined to make things go well enough to inspire the investing

public with a desire to come into any concern, the result generally happens as arranged. And when the business which is worked in this way is not a downright swindle, it is astonishing how much is done upon the basis of a little positive present prosperity and a large proportion of hope.

According to figures published in the *Engineer* with regard to the expense of electric lighting for a steam mill at Barrow-in-Furness, it may be gathered that the cost of an incandescent lamp service is at the lowest possible rate in the circumstances existing in this example. The installation consists of a No. 5 Mather and Platt dynamo, capable of supplying from 150 to 200 lamps of nominally 16-candle power at 100 volts. The dynamo runs at 1115 revolutions per minute (so that it must be classed among the high-speed machines); and it is driven by a horizontal engine of 10-horse power nominal, by Messrs. Marshall and Co. This engine is supplied with steam at 65 lbs. pressure from the mill boilers, is steam-jacketed, and is fitted with automatic expansion gear and a Hartnell governor. The plant was put down in 1885, and must be regarded as ranking among the best of its kind. It has cost altogether £420. The indicated horse power, taken over three years, varied from about 12 to about 20; and the lamps per indicated horse power averaged, as nearly as possible, 7·8. The fuel account is based on the assumed consumption of 3¼ lbs. per indicated horse power per hour. Charging interest on capital at 5 per cent., depreciation another 5 per cent., all lamp and machinery renewals and repairs as they occurred, but nothing for attendance or management, the yearly expenses ranged from £105 at first to £84 last year. The cost per lamp-hour was similarly from 0·079d. to 0·048d. Taking all the averages for six years, the accounts work out as follows: Annual cost, £92; cost per lamp-hour, 0·059d.; number of lamps lit one hour for 1d. = 16·9; hours run, 3392; lamps lit, 112·1; lamp-hours, 380,243; average cost of gas in Barrow, 3s. per 1000 cubic feet; calculated annual cost of equivalent lighting by gas, £313. Of course, it is admitted that the fact of no labour being charged to the electric lighting account renders these figures inapplicable to central station or private house lighting. We may also point out that the fuel account is remarkably low—averaging about £22 per annum, or less than £2 per horse power per annum. The price of gas as sold by the local undertaking also carries a profit. The statement is, however, interesting as showing what can be done in the circumstances. We also notice that the average life of the lamps was 3384 hours, which is pretty good evidence that they were not worked to their full illuminating power; and we should therefore not be surprised to learn that the lighting was by no means as brilliant as it was cheap.

The system of supply adopted by the Westminster Electric Lighting Corporation has been recently described, and the plant illustrated, in the *Electrical Review*, from which we take the following particulars. The system generally used is the low-tension feeder, with secondary batteries; three stations being at present required to generate the current, of which the principal or "head-centre" station is situated in Eccleston Place. Professor Kennedy is the Company's Engineer, and every section of the work has been put out for construction independently. Willans triple-expansion engines, directly coupled to Crompton dynamos, appear to be the favourite type of generators; and the efficiency of the combined machines is stated to be very high. Davey-Paxman "Windsor" engines are also employed. The steam-boilers are of the marine tubular type, provided with Green's economizers. The Crompton-Howell batteries play an important part in the working of the stations; being charged in parallel with the circuit during the hours of light load, so as to increase the load at these times. By the evening they are full, and remain standing so until the load has fallen to a point at which they can be allowed to discharge. The engines are then stopped, and the station shut down for the night; the batteries supplying all the electricity needed. In the summer months, the batteries will run all the morning also. It is to be remarked that these batteries do not answer all the purposes of a gasholder, inasmuch as they cannot reinforce the steam plant when a heavy load is suddenly cast upon it by a fog or a snowstorm. Upon a recent occasion of this kind, the load was multiplied five times within ten minutes, which means that a large reserve of boiler power is imperatively needed for these stations.

Electric lighting cables are not only capable of causing fires, but they are also, when in certain situations, liable to be damaged by fires otherwise originated. Thus the ever-unfortunate London Electric Supply Corporation suffered an interruption of service recently through a fire in one of the railway arches over which their mains run from Rotherhithe to London. It is true that the subscribers only had to do without light for one evening; but it is obvious that even this brief collapse will militate against the Company's prospects of recovering from the discredit into which they fell as the result of the burning out of their distributing station at the Grosvenor Gallery. The consumer does not pause to "reason why" when his lights go out, but promptly bestows his patronage upon some other system of lighting which he is persuaded is more to be relied upon. With regard to the risks and injuries ascribable to electric lighting systems generally, Mr. Allen R. Foote reported to the last meeting of the Electric Light Association of the United States that in the year 1890, in 425 cities of the Union, there were 518 fires directly caused by electric currents, 1719 injuries were sustained by servants of electrical companies on duty, 35 injuries from electric currents were received by men on duty at fires, 60 men were killed, and one man had a shock which knocked him off a pole 35 feet high, so that it was impossible to say whether he was killed by the shock or by the fall. It is sometimes said that electric lighting progress is much more generally visible in the United States than anywhere else; and, in view of these figures, we may be pardoned for feeling thankful that this is so.

THE TASK OF THE STANDARDS OF LIGHT COMMISSION.

The Standards of Light Commission have been in existence long enough for the members one and all to appreciate the bearings of the matter submitted to their arbitrament. By this time the least technical among the Commissioners should have mastered the work that has been done by their predecessors in this line of inquiry, and the *ultra*-scientific gentlemen who have been introduced for the first time to the statutory and commercial aspects of photometry will have realized the great practical importance of those refinements of photometrical instruments and methods which are sometimes accused of overloading and complicating the essentially simple laws applying to the phenomena of radiation. It may be months before the Commission are in a position to report; and meanwhile we have a suggestion to lay before all British Associations of Gas Managers, or of electricians, or other organizations of technicians interested in the subject generally. It is that as many of these societies as can conveniently do so should arrange to hold at least one full debate upon the matters understood to be occupying the attention of the Commission, in order that every possible aspect of the subject should find mention before it is too late. It often happens that when an official body of this character, after having held what is really a "fishing" inquiry into certain matters, has formulated the results in a report, somebody wakes up to a sense of what has been going on, and offers a suggestion which might have been fruitful if it had been timely, but which is perforce neglected because it is felt to be not worth while to reopen the inquiry for the sake of one detail consideration. In the present case of the Standards of Light Commission, the subject of the labours of the Commission was mentioned in an informal way at the recent meeting of the Southern District Association of Gas Engineers and Managers; and on this occasion several important remarks transpired, which would have been added to, in all probability, but for the scant time available for the purpose. As it was, however, statements were made at this meeting which are well worthy of the attention of the Standards Commission.

A fuller discussion of the subject would have been held at the recent Midland Association, but for unpropitious circumstances; and it is to be hoped that this debate is only deferred, not abandoned. It would be quite worth while to call a special meeting of the Association for the purpose, seeing that there are several members of this body who are known to take a particular interest in the matter; and it also embraces what may be called the border land reaching from the 14-candle districts of the South and West, to the cannel-gas regions of the Northern Midlands. This, however, is a question for the officers of the Association. We trust that at any rate photometrical subjects will not be lost sight of by the ruling authorities of the two national associations of gas engineers and managers who will meet in the course of the summer.

The electricians are taking a good deal of notice of the proceedings of the Commission, because they feel that, although they are not immediately concerned with these transactions, the finding of such a strong body cannot fail to impress all lighting industries. It is worthy of remark here that the report presented last year by the British Association Committee on Electrical Standards, of which Mr. R. T. Glazebrook, F.R.S., is the Secretary, contained a reference to the resolutions passed at the Paris Electrical Congress, which was attended by Sir W. Thomson and Mr. W. H. Preece, members of the Committee. As an English equivalent of the resolutions there passed, the Committee formulated certain recommendations, which they hoped would meet with general acceptance. The third of these resolutions is as follows: "The name of the practical unit of light intensity shall be the candle. The candle is equal to the twentieth part of the absolute standard of light as defined by the International Conference of 1884." Thus it will be seen that we were not speaking without book when, in a recent notice of the work of the Commission, we expressed the confident anticipation that the candle would be adopted by the Commission as the nominal standard of light. It remains to be ascertained, however, what a candle light really is. It is to be hoped that there will not be two or three different candle units in vogue as the result of the tendency actually operating in England, France, and Germany to adopt the candle unit without agreement on the subject; but there is great danger of this happening. We trust that the Commission will not propound their candle standard without referring to other candles; and that if it should be found impracticable to unite these standards, both the reason for the discrepancy and its amount will be placed upon record.

It is obvious that, although the Commission may take cognizance of the different standard candles in existence, they cannot follow them in the selection of their own. Indeed, the

work of the Commission in this regard is not, strictly speaking, one of selection, but rather of definition. They cannot get away from the parliamentary standard candle which is mentioned in the Acts of Parliament relating to the gas supply of London; and what they have to do is to define the value of this statutory candle at the time when it was legalized. Scientifically speaking, the parliamentary standard candle light may be as vague and unsatisfactory a quantity as the "size of a piece of chalk" mentioned in the legendary culinary recipe given by Captain Marryatt's black cook; but there it is, and its value must be settled before its equivalent representation can be decided upon. The ultimate candle light, of which the Commission can say, "this is what Parliament bound the London Gas Companies to observe as the measure of the illuminating power of their gas," must and will prevail over the less authoritative candles of the other standard-makers. But if it should be found to differ from them, there may be a period of irritating confusion before unanimity is attained—especially if the British Association candle should turn out to be more favourable to the electricians.

It is desirable to point out in this connection that the so-called "decimal candle" adopted by the French electricians, and after them by the British Association Committee, is hardly deserving of much respect. Its origin is about as unscientific and fantastical as can be imagined; and if anybody else than modern "scientists" had committed themselves to such a curiously illogical and unpractical way of deducing a standard of measurement, our modern materialistic philosophers would have poked any amount of fun at them for it. In 1884, on the occasion of the holding of a "scratch" International Congress of Electricians in Paris, which was in point of fact a meeting of more or less eminent personages who did not and could not represent anybody but themselves, it was proposed that an absolute standard of light suggested by a Frenchman—M. Violle—and defined as the light radiated from a square centimetre of the surface of molten platinum at the point of solidification, should be adopted. This was done forthwith; and the assembled notables flattered themselves upon having settled an old difficulty, and at the same time passed a graceful compliment to French science. From that moment nothing has been seen of the Violle standard, which has become a figment of science. Last year, however, by way of whitewashing the resolution of the former congress, the electricians adopted the so-called decimal candle, which may or may not be a real candle light, but is taken, for the sake of verbal exactitude, to be the one-twentieth part of the Violle standard. So far as is known, this decimal candle has no simple ratio to either the French carcel or the English candle. We do not even know whether it has real existence; but surely, out of Laputa, where the tailors took their customers' altitude by the sextant in preference to using a tape measure, there has been no such example of scientific pedantry as this of the derivation of the "decimal candle" from a fictitious unit in preference to taking the candle as it is. It is something that the electricians have been sensible enough to call their chosen working unit of light by the common name of candle, instead of naming it a "thomson," or a "swan," or a something else intended to immortalize one of themselves. When the present Commissioners, who have nobody to whitewash, tell the world exactly what a candle light is, and how it can best be obtained, we have little doubt that their valuation will prevail over all other less carefully derived standards called by the same name.

It is one thing to resolve upon the adoption of the parliamentary standard candle as the unit of light for photometrical purposes, and to state how this amount of light may be obtained; but it is quite another business to render its reproduction easy and reliable, and to arrange a convenient system of photometry in connection with it. Our electrical friends feel somewhat reproached on account of their inability to produce an electric lamp which can be trusted to represent the standard candle or any multiple thereof. Upon this topic the *Electrical Review* remarks: "After vain endeavours to trace a proposal of this nature, in the search for which we have had the assistance of many kind friends of the highest eminence in the scientific world, we are reluctantly compelled to say that there exists no simple and practical electric means of comparing lights." Discussing various projects that have been advanced to this effect, our contemporary dismisses platinum (molten or incandescent) and selenium, as too untrustworthy to enter into the composition of photometrical apparatus. It is suggested, however, that "Mr. Swan or Mr. Swinburne would undertake the production of vacuum lamps with a straight filament of carbon of the hardest kind, and having a smooth polished surface of sufficient constancy for practical purposes; and that such lamps, properly standardized and occasionally renewed, and used with an ammeter, would give greater uniformity of measurement than the standard candle, and with much less trouble." The main difficulty here would be the impossibility of saying when, and to what extent, such a lamp has gone wrong.

It is so far satisfactory to note that the *Electrical Review* is not particularly taken with the amyl-acetate lamp. The suggestion is thrown out that if a non-portable arrangement would be of any use, something might be done with a radio-micrometer; but no attempt is made to show that spectro-photometry is of any avail for commercial purposes. It may be remarked here that a "Treatise on Photometry," with special regard to electric lighting, by M. Palaz, has been recently published by G. Carré, Paris, which contains a good deal of information upon the subject of standards of light. This author, however, while criticizing all known standards, does not suggest anything better. As an indication of the uncertainty that prevails with regard to the relationship of the usual standards, it may be stated that M. Palaz gives the following comparison: One Violle unit = 2·08 carcels; or 16·4 German normal candles; or 18·5 English candles; or 18·9 Hefner-Alteneck lamps. This valuation differs from all others previously published.

In view of the length to which this article has already extended, it will be impossible to do more than refer to the questions of the value of the working photometrical standard, the method of its production, and the design of the photometer—all of which await the attention of the Commission after the basis of exact photometry shall have been laid by the definition of a satisfactory standard of light. We shall return to these considerations on a future opportunity.

LEWES ON AIR AND WATER.*

One of the latest additions to the useful University Extension Series of books published at the uniform price of half-a-crown by Messrs. Methuen and Co. is a small volume bearing the title "Air and Water," written by Professor Vivian B. Lewes. It is an unpretentious work; but it can be confidently recommended to science students and home reading circles as "elementary" in the very best sense of this much-abused term—that is to say, it is sound, reliable matter, expressed in the simplest and clearest language. It is elementary as Professor Huxley's educational works are elementary; and no higher praise can be accorded to the author than to rank his book with those of the great teacher who, treating of Physiology, Physiography, and so forth, showed learners for the first time how much scientific truth can be expounded in simple words. Time was, and is unfortunately not yet wholly past, when the preparation of popular handbooks of science was left for smatterers—the adepts despising such things; with the deplorable result that beginners picked up in their most impressionable years as much error as truth, and perhaps, on the whole, more of the former than of the latter, to their lasting detriment. The admirable University Extension movement has altered this for the better; and whoever follows the teaching of the lecturers and writers who are connected with this and certain other well accredited modern agencies for disseminating useful knowedge, need not fear having to go over the ground again before proceeding to more advanced studies. Younger readers of the Journal, and even some of an older growth, will be sure to find in Professor Lewes's little book much instruction in subjects in which gas engineers must now be fairly well versed. Lighting, warming, and ventilation come in for a share of the author's attention; and it is hardly necessary to state that the references to these matters are always fresh and reliable. So far as we have been able to test it, the book is absolutely free from padding. All the information given is either first-hand, or its source acknowledged and its value criticized. The difficult question of the injury done by burning gas in badly-ventilated rooms, for instance, is treated in the light of the author's latest researches, which have exculpated the "sulphur compounds" from the blame of causing all the destruction to leather bookbindings, &c., once exclusively attributed to them. In the other division of the book, the equally debateable subject of the sewage contamination of water supply is similarly well dealt with. Understanding of the lucid text is facilitated by illustrations wherever necessary; and the book has an index. The printing is clear and the paper good. Altogether, we have sincere pleasure in testifying to the value of this admirable little volume, the readableness of which has been preserved, albeit at no sacrifice of clearness, by the absolute exclusion of all chemical and mathematical formulæ, and of everything ever so distantly resembling a diagram.

Mr. R. J. Jenkins, C.E. (of the firm of Messrs. Newton, Jenkins, and Co.) has been appointed Chairman of the Bridport Water-Works Company, Limited.

The City Gas Examinership.—At their meeting last Thursday, the Committee of the Common Council who were entrusted with investigating the qualifications of the various candidates for the appointment of Gas Examiner to the Corporation, rendered vacant by the death of Mr. Charles Heisch, decided to submit to the Council the names of Professor Vivian B. Lewes and Dr. S. Rideal.

Mr. S. Hesketh, an assistant at the Wallasey Gas and Water Works, has been appointed Assistant-Manager of the Wrexham Gas Company. There were 64 candidates for the situation, in response to the advertisement which appeared in the Journal early in the year, under No. 2057; and it may be mentioned that the applicant selected owes his success, in a measure, to his having obtained an Honours certificate at the last examinations in Gas Manufacture.

* "Air and Water." By Vivian B. Lewes, F.I.C., F.C.S., Professor of Chemistry at the Royal Naval College, Greenwich, and Lecturer on Chemistry to the London University Extension Society. London: Methuen and Co.; 1892.

NOTES.

Coke-Breeze Concrete.

The discussion upon the subject of coke-breeze concrete, which has recently run through the correspondence columns of the *Builder*, has left the reputation of this material unimpaired. One writer avers that he has used it for the last 24 years, principally on account of its lightness; and he pronounces it an invaluable material for landings, stairs, floors, balconies on cantilevers, and other purposes too numerous to mention. He also says that he has known shingle concrete, gauged in precisely the same manner, to crack while breeze concrete has stood without the slightest indication of failure. The proportions recommended by this writer are six parts of breeze to one part of cement, with care not to use too much water, and to keep the concrete damp for a few days if exposed to the sun, but not otherwise. A thickness of 2½ inches is stated to be sufficient for landings, &c.; and the great secret is defined to lie in gently tapping the concrete with a broad-bottomed wood punner till the whole is brought up to a level surface. When thoroughly dry, flooring-boards may be nailed directly upon the concrete. This correspondent also states that he has just completed a theatre, all the landings and stairs of which are of coke-breeze concrete, which was only completed eight or nine days before the opening, yet stood perfectly under heavy loading. Mr. W. Simmons describes how he constructed some years ago, in London, about sixty floors of coke-breeze concrete without joists, and with spans of 12 and 14 feet the narrow way of the rooms. The concrete was laid 7 inches thick, and had 2½-inch by ½-inch flat-iron bars on edge buried in it 18 inches apart an inch above the soffit; the ends being threaded on continuous iron rods built into the walls. Each floor was made as the walls reached the required level. A cement ceiling and floor surface afterwards increased the thickness to 9 inches. The roofs were similar, but asphalted on the top. The only fault was that the rooms were cold in winter, owing to the rapid conduction of heat through the concrete. Mr. Simmons remarks that, if he were repeating the construction, he should make the floors double, by putting a second skin of concrete 3 or 4 inches thick on rough boards, on bearers resting on the main slab. These boards would have to remain in, as they could not be taken out. It may be questioned whether this is not a superfluously heavy construction.

Test of a Locomotive-Type Boiler.

Mr. Bryan Donkin, jun., and Professor Kennedy, F.R.S., in the course of their standardized steam-boiler experiments, already referred to in the JOURNAL, tested a new portable locomotive type of boiler with a steel shell, by Messrs. Marshall and Co. It was working without any brickwork protection, and was not housed in any way. The boiler got up 70 lbs. of steam in 39¼ minutes, starting all cold. It was fired by hand in small quantities, very frequently; the fire-door being kept open as short a time as possible. The boiler was lagged in the usual way with felt and sheet iron; and the steam, which was kept at about 61 lbs. during the test, was used to supply a compound steam-engine. The general dimensions of the boiler were as follows: Fire-box inside, 3 ft. 3 in. by 2 ft. 11 in., and 3 ft. 1 in. high from the fire-bars; diameter of barrel, 3 ft. 7 in., and 7 ft. 9 in. long, with 50 tubes 2¼ inches in diameter. The total heating surface of the boiler was 316 square feet. In the course of the eight hours' trial, the furnace burnt 960 lbs. of coal; and the equivalent evaporation per pound of coal from and at 212° Fahr. was 10·78 lbs. of water, corresponding to 11·25 lbs. per pound of pure and dry coal. According to the balance-sheet of the boiler, 69·8 per cent. of the total heat went to heating and evaporating the water; 18 per cent. is accounted for in the furnace gases; and 5·7 per cent. was lost by radiation —leaving 5·2 per cent. unaccounted for.

Flared Coal Tar for Waterproofing.

According to the *Revue des Travaux Publics*, the use of coal tar as a means of rendering masonry impervious to water is much favoured in France. There are two ways of preparing the tar for this use—boiling and flaring. The former method is suitable for surfaces intended to be exposed to the atmosphere; while the latter is appropriate for surfaces to be covered up by masonry, earth, &c. By adding to the coal tar a paste made by dissolving india-rubber clippings in benzene, a coating may be obtained which is still more resistant, elastic, and durable. For roofs, the heat-absorbing quality of these black varnishes may be overcome by dusting them with any permanent white earth before they are quite dry. For masonry to be covered up, the use of flared tar is highly recommended. This is prepared by boiling the tar in a cauldron, and filling a bucket two-thirds full from it. The tar is then lighted at the surface, and allowed to blaze for 15 or 20 minutes; being constantly stirred the while with an iron rod. When a drop from the blazing bucket upon cold stone has the consistency of thick soup, the flare is extinguished by covering down the bucket with an iron lid. The tar will then be reduced to one-third its original bulk; and it must be spread as rapidly as possible upon the work with a cod-tail brush of vegetable fibre—care being taken to dip often, so as to prevent its cooling and hardening prematurely. If the flaring process is prolonged beyond the proper moment, the result is a brittle product like sealing-wax. When the flare is stopped at the right time, the resultant tar adheres very firmly to any surface, and can be immediately covered up with earth. It has a skin both hard and tough, underneath which is a viscous layer about 1-25th of an inch thick, which preserves its integrity for any length of time.

An Explosion Experiment for the Lecture-Room.

A pretty and simple lecture experiment, illustrating the explosion of coal gas, is described by Dr. T. O'Conor Sloane in the *Scientific American*. The only apparatus required for it are a couple of common tin funnels of the same size, and a wide india-rubber band. The funnels are placed mouth to mouth together; and the band is sprung over their junction. It is well to secure this band by a string, in order to prevent it from being blown too far by the explosion. The funnels thus adjusted are then placed over a gas-burner, unlighted; and the gas is turned on for a few seconds, to drive out the air in the interior of the funnels. It is then lighted at the upper end, where, of course, it will burn quietly enough if the arrangement is properly made. After the gas-flame has been fairly established, the funnels are taken off from the gas connection, which is turned off. It is only necessary to hold the funnels quite free in the hand, taking care that neither end is in line with the clothing or any part of the body. The flame continues to burn at the top as the gaseous contents of the funnels rise, until the presence of the air that flows in at the bottom betrays itself by the increasing blueness and diminishing luminosity of the flame. The flame grows rapidly smaller, until it turns green and disappears down the tin tube. Soon afterwards, the explosion occurs; forcing the funnels apart with a startling report. With hydrogen, the explosion is much more violent.

The Liberty and Property Defence League—an organization for "maintaining freedom of contract, upholding proprietary rights, and resisting socialistic legislation"—whose efforts in the direction indicated in their title have been frequently noticed in our columns, give tangible proof of their alertness by their liberal distribution of leaflets or pamphlets bearing upon questions which affect the class who have much to lose, and little to gain, by the progress we are making towards democracy. The "Taxation of Ground Values" is ably dealt with in two leaflets just to hand; and, under the title of "Property in Land," Mr. J. C. Spence presents, in a small pamphlet, a defence of individual ownership.

The Murdoch Memorial.—In the JOURNAL for Jan. 12 last (p. 61), it was mentioned that the Secretary and Treasurer of the Murdoch Memorial Committee of the North British Association of Gas Managers (Mr. James M'Gilchrist, of Dumbarton) had applied to the Custodians of the Wallace Monument at Stirling for permission to place therein a bust of William Murdoch, the inventor of gas lighting. Last week he received from the Town Clerk a communication announcing the acceptance of the offer; and as either bronze or marble was the material suggested in Mr. M'Gilchrist's letter, the Custodians have expressed a preference for the latter. The next meeting of the Association will accordingly be held in Stirling in July; and occasion will then be taken to unveil the bust.

Sad Death of a Water Engineer.—On Sunday, the 13th inst., Mr. Lean, the Engineer of the proposed extension of the waterworks on Booth Dean, belonging to the Wakefield Corporation, died somewhat unexpectedly at Rishworth, at the early age of 31. He had been away on the moors on the preceding Monday in the discharge of his duties; and it is supposed that, owing to the extreme severity of the weather, he contracted a cold which developed into influenza, followed by other complications. Medical aid was obtained; but, despite all efforts, he succumbed to the disease. Mr. Lean was from Gloucestershire, and only took up his residence at Rishworth (with his wife and one of his children) about three weeks previous to his death. His remains were removed to Gloucester for interment.

Annealing in Coal Gas.—Referring to the process described in the "Note" under this heading in a recent number of the JOURNAL, Mr. Thomas Fletcher writes that, like many others, it appears to be an old English one, taken abroad and brought back again as a novelty. He says it was used by himself fully ten years ago; and he found by experiment that it was quite unnecessary to fill the annealing chamber with either coal gas or nitrogen, as a small jet of coal gas burning at the openings ensured a perfect reducing atmosphere. In a lecture delivered by him before the Society of Arts on Jan. 30, 1884, and which was published in our columns, he described the simplest method of using coal gas for preventing oxidation, and ensuring a reducing atmosphere in heating and annealing chambers without the necessity for sealing these closely. In fact, the process was, he says, first devised for heating and hardening polished steel wire in continuous lengths. Another method tried in close chambers was a slow continuous dropping of petroleum into the chamber; but this was not carried out in practice at the time, as the gas was found simpler and safer. Mr. Fletcher states that if a large chamber is used, the opening of this, when filled with either coal gas or petroleum vapour, is sometimes neither a pleasant nor a safe operation; whereas if comparatively small jets of gas are employed at the openings, they will burn inside the chamber until the oxygen is exhausted, and will then burn at the openings.

COMMUNICATED ARTICLE.

THE CONSUMERS' INTEREST IN THE RATING OF GAS-WORKS.

By Norton H. Humphrys, Assoc. M. Inst. C. E.

Several recent rating appeals made by gas companies, and the costly legal proceedings in connection with them, naturally direct attention to the questions of who is to pay for it all; and so much misapprehension prevails on this point, outside the circle of those really concerned in the matter, that it seems desirable to trace the actual facts. The contest is usually supposed to rest between the gas company and the rating authorities. If the result has any marked effect, one way or the other, on existing arrangements, the one is said to be so much the better, and the other so much the worse off. Gas consumers, through their public representatives, will with one breath say that the company have so much money to spare that imaginary "repairs and renewals" have to be conjured up as a means of disposing of the surplus, and with another blame them as parsimonious for resisting an increase in the rating assessment. They will even rejoice if the company's appeal is unsuccessful; apparently on the ground that the shareholders will be compelled to disgorge some of the exorbitant profits, which popular prejudice, founded on the slight basis of high nominal rates of dividend, accredits them with receiving. This sort of reasoning appears to be founded on the tacit assumption that the amount due for rates is chargeable upon the profits, like income-tax.

The suggestion that the company are not fighting their own, but the consumers' battle, may perhaps be almost received with derision; yet such is the fact. A glance at any statutory balance-sheet will reveal the fact that the rates are one of the charges on the "Dr." side of the revenue account; and therefore as much a part of the expenses of producing gas as the cost of coal or labour. Turning to the balance-sheet of the South Metropolitan Gas Company for the six months ended Dec. 31, 1891, as an illustration, there will be found, among other items, the sum of nearly £18,000 paid as rates. The Gaslight and Coke Company, during the same period, paid upwards of £79,000. To all intents and purposes, so far as the profit is concerned, these amounts might be represented by additional cost of coal, labour, or any other of the items in the revenue account. The charge is in no sense a deduction from the rates of profit; on the other hand, it is *a direct tax on the consumer of gas*. It means that, for each 1000 cubic feet of gas sold by these two Companies, the purchaser has to pay something like 1½d. or 2d. towards the rates. The case may be fairly put by supposing the company to pay no rates themselves, but simply to act as the collectors thereof from the consumers. Or, to put the matter in another way. If a gas company's payment, as shown in their revenue account, represents (say) 2d. per 1000 cubic feet, we may suppose that the company, having no rates to pay, sell their gas for 2d. per 1000 cubic feet less, and that the rate collector has the power of examining the gas bills, and mulcting each consumer to the extent of 2d. per 1000 cubic feet of gas used. Such a plan would apparently put the matter in a very different light, so far as the user of gas is concerned; but, in reality, it would not disturb the condition of things at all, with one slight exception, to which attention must be drawn.

Gas companies subject to fixed rates of dividend would pay that rate as before. The price of gas being 2d. per 1000 cubic feet lower, would not have the slightest effect. But where the sliding scale is in force, with the usual provision of an increased rate of dividend at the rate of 5s. per cent. for each 1d. below the initial price per 1000 cubic feet, it would give some little advantage to the company, by enabling them to pay the shareholders an additional ½ per cent. dividend. Here we touch upon one of the defects of the sliding-scale system, which would be perfect if the price of gas depended entirely upon the results of careful administration. It is possible to conceive such a thing as a saving of 2d. per 1000 cubic feet by good management, combined with a loss of 4d. due to increased price of coal; and thus a circumstance over which the company have no control may swallow up the effects of their skill, and with it the right to the reward to which they may justly be entitled. On the other hand, we may have a badly-managed concern, able to sell gas cheaply on account of fortunate circumstances, and therefore reaping, by the medium of the sliding scale, large benefits which they do not actually deserve. Of course, all trading concerns are subjected to risks of a commercial nature; but it is not just that such risks should bulk largely in a parliamentary regulation that professes to offer both a reward and an inducement to careful and skilled administration.

Having advanced so far, we are in a position to appreciate the effect of a substantial increase in the rateable value of a gas undertaking, from the shareholders' point of view. It may be very briefly stated thus: Where standard or maximum rates of dividend are in force, the company could, and probably would, go on paying them as before. But with the sliding scale, the allowable rate of dividend would be moved down a few points. It has just been observed that the amount payable for rates in one case represents 2d. per 1000 cubic feet. If the increase was at the rate of 50 per cent., that item would then represent 3d.; and the cost of producing gas would be increased to the extent of 1d. per 1000 cubic feet, which would be a difference to dividend of 5s. per cent. Even supposing a direct connection between the increased rate and the sliding scale, the effect would not be very important.

To all this a rejoinder may be made, in the form of a question as to why the companies concern themselves about the matter of rating at all, beyond paying whatever may be demanded. Granted that the standard-dividend gas undertakings are not affected at all, and the sliding-scale ones very slightly, it seems rather Quixotic to fight the consumers' battles for them. Is it sentiment or sheer obstinacy that makes gas companies look carefully after the rating assessments? The fact is that, though no direct effect is visible, in the form of a levy from the dividend-box, gas companies are indirectly interested in selling gas as cheaply as possible. Notwithstanding the popular prejudice, based upon high nominal dividends and large sums carried to reserve, it may be taken as a fact that, as a general rule, the endeavours of the Board are directed towards the goal of cheap gas. Whether or not they always follow the best means to that end, is, of course, a matter that is open to debate. They know that it is only by selling gas at a reasonable rate, capable of bearing fair comparison with what is usual in undertakings of similar size and circumstances, that they can hope to maintain the good-will of their customers, and the solidity and security of the interests in their charge. And therefore it is that gas companies protest against anything beyond a fair and reasonable assessment of their property.

The usual way of meeting arguments of this kind is to refer to actual practice as a different thing from theory, and to say that, although the principle may be wrong, there are compensating influences that come in under actual working, and that the thing rights itself. A common feature in this style of reply is to mix up the gas consumer and the ratepayer in the manner peculiar to members of the gas committees in towns where the gas supply is in the hands of the public, and large sums are annually subsidized from the gas revenue for public improvements; or, putting it more euphemistically, for the relief of the rates. When gas was employed only for lighting, it was possible that, if a ratepayer used gas at all, there was some sort of rough-and-ready proportion between the gas bill and the rate demand-note. But in these days of stoves, engines, and technical appliances, a small ratepayer may be a very large gas consumer, or *vice versâ*. In the case of the high gas bill, it is a question whether the consumer would be pacified by knowing that the extra 1d. per 1000 cubic feet went in relief of the rates. It is evident that the gas undertaking should be fairly, and not exorbitantly rated, and that more in the interests of the consumers than in those of the shareholders. I think that, if the question were more generally clearly understood, we should find the gas consumers represented at rating appeals; and there would be an end to the unique spectacle of the appeal being presented by those who have only a secondary interest in it, while the primary party not only stands aloof as an indifferent spectator, but frequently ranks itself on the opposite side.

The Royal Commission on Water Supply.—The first meeting of the Commissioners appointed to consider the question of the Metropolitan Water Supply took place last Wednesday, at the Board of Trade, under the presidency of Lord Balfour of Burleigh; the other Commissioners present being Sir G. B. Bruce, Professor Dewar, Mr. G. H. Hill, Mr. J. Mansergh, and Dr. Ogle. The preliminary procedure was the only matter discussed; and the Commission adjourned till to-morrow. Mr. F. Gaskell, Secretary to the Local Government Act Commission, has been appointed Secretary.

Rainfall Statistics.—At the Institution of Civil Engineers last Tuesday, Mr. A. R. Binnie, M. Inst. C. E., Chief Engineer of the London County Council, read a paper "On Mean or Average Annual Rainfall." After an examination of 42 records from various parts of the world, extending over periods of from 50 to 97 years, and comprising 2535 annual observations, the author showed that the extreme deviation from the mean of different periods of observation might be: For 5 years, 14·93 per cent.; for 10 years, 8·22 per cent.; for 15 years, 4·75 per cent.; for 20 years, 3·24 per cent.; for 25 years, 2·75 per cent.; for 30 years, 2·26 per cent.; and for 35 years, 1·78 per cent. It was also shown that these probable errors were very similar in value both above and below the mean; there being but a small difference of about 1 per cent. between the values for these errors when they were considered as *plus* or *minus*. From a comparison of the various records, it did not appear that the geographical position of the stations had any effect on the amount of the above errors, but that they could be applied, within the limits noted in the paper, to rainfall observations in all parts of the world. An examination of 13 records and 688 annual observations, having falls of from 30·27 up to 94·13 inches, the mean of the whole being 43·62 inches, with 13 similar stations and 686 annual observations, the falls of which varied from 19·83 up to 30·20 inches, and averaged on the whole 26·27 inches, resulted in a difference of about 1 per cent. in the values of the errors derived from the two groups—a difference within what the author showed to be the probable error of all similar investigations. There was, however, he said, a small, though marked, tendency to a greater amount of probable error in the group of 13 stations of low fall, and a corresponding tendency to a decrease of the probable error in the group of 13 stations which had the greater rainfall.

TECHNICAL RECORD.

NEW ENGLAND ASSOCIATION OF GAS MANAGERS.

Annual Meeting at Boston.

The Twenty-second Annual Meeting of this Association was held at Young's Hotel, Boston, on the 17th and 18th ult., under the chairmanship of Mr. H. A. ALLYN, of Cambridge (Mass.), the President.

After the usual preliminary and routine business had been transacted, the President delivered an Inaugural Address, in the course of which he congratulated the members on the increase in the demand for gas, which was reported on all sides. He referred to a Bill passed by the Massachusetts Legislature during the year, entitled "A Bill to enable Municipalities in Massachusetts to distribute Gas and Electricity," which, he said, was undoubtedly carried through by the Nationalists. It enacted that any city or town might construct or control works for these purposes, provided that such a course was approved by a majority of two-thirds of the City Council for two consecutive years, and ratified by a majority of the voters at an annual election. In the case of existing gas or electric lighting works, they are to be purchased, subject to arbitration, &c., in the event of disagreement as to terms. As first submitted, the Bill was different in tone; but as passed, the rights of the companies appeared to be properly protected. Turning to the gas industry generally, he said, as regarded residuals, the advances in price of coke, tar, and ammoniacal liquor were extremely satisfactory. Electric lighting was becoming steadily developed; and those who did not intend to become identified with it must exercise determined and persistent effort if they were to hold their own. The price of gas should be reduced as low as possible, and energetic action taken for securing increased business. If it paid other people to keep travelling salesmen, why should it not pay gas companies to do so? He would like to see infused into gas directors some of the push and energy that characterized the managers of the electric light companies. As to the proposition to combine gas and electric lighting interests, in the majority of cases he considered that no benefit could accrue to the gas company by such coalition. He was not yet satisfied as to the profit earned by the supply of electric lighting, and he thought that where a gas engineer was called upon to take on the management of a supply station, in addition to his ordinary duties, the chances were that the new branch would occupy too much of his time and attention, to the detriment, of course, of the other. Notwithstanding numerous improvements in gas-burners, there was still room for one that gave a high duty, and was also cheap, simple, and durable. Speaking of water gas, he mentioned that a mixture of one part of water gas to two parts of coal gas gave satisfaction to the users, and enabled a high-quality gas to be sent out. Although the supply of coal had been abundant during the year, there was a great deal of complaint as to the quality. In conclusion, he offered a few words of advice to the younger members of the Association. They should, he said, control their tempers, and cultivate a cordial and friendly feeling with city or town officials, with whom they had business. It was even more important that they should retain the goodwill and confidence of the consumers, by uniform courtesy and careful attention to complaints.

Mr. F. Richardson, of North Adams (Mass.), then read a paper on the desirability and advantage of gas companies owning and operating a combined gas and electric lighting plant. He said that less than ten years ago his sale of gas was about 5 million cubic feet per annum, and the price 12s. 6d. per 1000 cubic feet. Now it was nearly 24 millions, and the price 7s. 6d. and 6s. 8d.; in addition to which 140 arc and upwards of 500 incandescent electric lights were supplied from a central station under the same roof. In 1885 an electric light and power company was formed in his district; and as it was found that it was well supported, and that the demand for gas was diminished in consequence, his Company gradually bought up all the shares, and obtained powers from the Commissioners to generate and furnish electricity. It was thought that £5000 would cover the cost of a new electric station; but nearly double that amount was actually spent. They took care to secure the best machinery and plant obtainable; and the outlay had proved a judicious one. The retort-house was extended to include a building 20 ft. by 37 ft., which served as a boiler-house; and adjoining this was the engine-room, 36 ft. by 55 ft., which contained a 150-horse power engine, and all the generating machinery. The boiler put in was of an upright tubular pattern, with very large heating surfaces. It was capable of evaporating 7 lbs. of water per pound of coke, or 10 lbs. per pound of soft coal used in the furnace, and was very efficient both in rapidly getting up and also in retaining heat. The engine was supplied with steam at 100 lbs. per square inch, and ran at 125 revolutions per minute. The floor of the machine-room was distinct from the side walls—being supported by piers; and thus all jar or shaking from the machinery was avoided. The commercial circuits were run till midnight; the arc lamps being charged 1s. 4d. to 1s. 8d. per night each, and the incandescent lamps 3s. 6d. to 4s. 2d. each per month. The public lamps were supplied all night; but only charged for at the rate of 1s. 3d. per night. Altogether, he was very well satisfied with the step he had taken.

In opening the discussion on the paper, Mr. Stiness said he agreed that an electric light plant could be run more economically, and would give better service, when in combination with a gas plant, than in any other way. In his case, the gas portion of the undertaking had not suffered, while the electric light department had increased beyond their most sanguine expectations. He was engaged in erecting a 4000-horse power plant, which when complete would cost £30,000. He thought the reader of the paper had put the advantages of the combined plant before the meeting in a very fair and temperate way. Dr. Amory, of Boston, said that in his case he had not applied surplus earnings, but had a separate capital for the electric lighting plant. After trying everything in the way of introducing stoves, lamps, &c., they found that the introduction of electricity reduced the consumption of gas; and therefore, like the author of the paper, they had bought up the electric light undertaking. It was better to do this at a fair price than to lose money in competing. The electric light was very useful on a gas-works, in the purifier-house and other places where it was not wise to have a naked light. Mr. C. H. Nettleton, of Birmingham (Conn.), said he was glad that his Company had taken up the electric light, although they had not made much profit from it. From his five years' experience, he could say that the combination worked well for small companies. He was surprised to hear that 1 lb. of coal would evaporate more water than 1 lb. of coke; having always understood that the reverse was the case. Mr. Harbison remarked that he had not yet heard, either from the author of the paper or from previous speakers, of any definite advantage to a gas company from having an electric lighting plant connected with it. He gathered that both Mr. Richardson and Mr. Stiness had invested in the electric light business surplus earnings derived from the sale of gas, after paying dividends. In that case, their profits must be large, and their prices high, and therefore sensitive to competition. He had hoped to hear how many stoves had been sent out, and by how much the cost of gas had been reduced, or the quality improved, during the time the electric light had been worked; but he had been disappointed. Nor had he heard how many million cubic feet were added to the annual output of gas by taking up the electric light. The Association represented men engaged in the gas industry, to whom such details would be more interesting than those about electric lighting. He apprehended that all the time bestowed by a gas manager on anything outside his proper business was employed at a loss to the industry with which he was connected. He hoped those who took up electricity would not overlook the fact that the gas business was still alive, that money might be made in it, and that in all towns there was yet a large field for extension. He agreed with a remark in the presidential address, as to the desirability of employing salesmen for extending the use of gas. In making these remarks, he had no feeling of hostility to the electric light; and he wished his friends every success with it. At Hartford there were two electric light companies, and they took away the public lighting—one-eighth of his total output; but he had quite recouped that loss. A year ago he increased the illuminating power of the gas 20 per cent., by the admixture of water gas with it—keeping the price the same. He believed in low prices for gas, with discounts for cash and for large consumption. Mr. A. C. Humphreys said he did not believe that a hard-and-fast rule should be laid down, but that the managers of each company should investigate local conditions for themselves. In small companies there was a certain waste that might be profitably employed in electric lighting; but this did not exist in large companies. Mr. Lamson agreed that the question was worth careful consideration; but said he believed that, in most places where the combined plants were worked, it was the gas business only that earned the dividends. In a small works there was undoubtedly some waste of labour that might be utilized in working the electric light. Mr. Neal said that, in the case of two companies with which he was concerned, the electric light department had been a paying one, though perhaps not so profitable as gas. He had no cause to regret having adopted the electric light. Mr. Lane pointed out that in some small towns the gas company earned a 5 or 6 per cent. dividend; but the electric light company were running as much the other way. Where, he asked, was the advantage of combining in that case? Mr. Richardson, in reply, said he was a staunch gas man, but also a firm believer in the advantage of operating a combined gas and electric lighting plant. In his case, the electric light department earned 12 per cent. profit. Perhaps it might not do in large towns; but it was a decided success in his particular case. His was a factory town, with but a small consumption for dwelling-houses.

Mr. Saville produced a specimen of wooden gas-pipe, which had been in use for 17 years, and was quite sound. He said he laid about 1 mile of 4-inch and 1½ miles of 2-inch wood pipe; but the smaller size was made of sappy material, and it rotted so quickly that he had to take it all up in two or three years. He was gradually doing away with the 4-inch, as it was leaky. Perhaps one pipe in 20 showed signs of decay; and the town authorities had requested him to remove it. He supplied oil gas, made by the Hanlon process; and at the time the pipes were laid, it was thought that the gas would tend to preserve the wood. Mr. Richards said that at a town in Michigan some miles of wood pipes were laid; but they had to be taken up

again. It was put down in hot weather, and he was told that the soil, after being for some hours exposed to the sun, was so hot that when it was filled in round the pipes, it caused them to crack and shrink. Mr. Todd observed that he had in use about 600 feet of 3-inch wood pipe. It was laid 16 years ago, and was now getting leaky. Several joints had sprung; but it was only where the tar coating was damaged that the pipes themselves had rotted.

The Committee appointed to secure a representation of the interests of the gas industry at the Chicago Exhibition then presented their report. It set forth that a representative Council had been formed in New York, and that Mr. M. S. Greenough was present that day as a deputation. Mr. Greenough then read copies of two circulars which had been issued to every gas undertaking in America. The first stated that a Committee had been formed, for the purpose of erecting a building, securing exhibits, and maintaining a creditable show of gas appliances at the exhibition. After giving details of the scheme, support was solicited on its behalf. It was signed by a large body of gas engineers and others, well known in the American gas industry. The second circular stated that space for a building 300 ft. by 150 ft. had been secured, and that no time should be lost. As a guide to the amount of subscriptions required, it was suggested that a sum equivalent to $4 per million cubic feet of gas made per annum would be needed for the successful completion of the scheme. It concluded with the suggestion that a general assembly and reading room for subscribers might be provided, in which the 1893 meeting of the American Gaslight Association could be appropriately held. Mr. Greenough proceeded to enlarge on the necessity of the proper representation of the gas interests at Chicago, which, he said, involved a capital of four or five hundred million dollars. If sufficiently supported, the Committee proposed to follow the action of the French gas companies at the last Paris Exhibition, and show the latest developments in gas appliances. Visitors from every town would go to the exhibition; and therefore every gas company in America would be directly benefited by it. He also thought it would be possible to communicate with gas engineers in Europe, with the view of securing models, plans, and other interesting exhibits. Mr. A. C. Humphreys followed; and said that, if the thing was to be done at all, from £40,000 to £50,000 must be provided. Mr. Slater moved that the action taken in this matter should be approved and heartily endorsed by the Association. Dr. Amory seconded the motion; and it was carried unanimously.

(To be continued.)

EXPLOSIONS CAUSED BY COAL DUST.

At the Meeting of the Chemical Society last Thursday week Professor T. E. Thorpe, F.R.S., contributed a paper, entitled "A Lecture Experiment to Illustrate the Phenomena of Coal-Dust Explosions." The evidence of experts was summarized in support of the contention that air charged with finely-divided coal dust may propagate an explosion in the absence of fire-damp. Brief details of some of the most disastrous colliery explosions of the last two decades were given; and the manner in which the aggregation of charred dust and *débris* gave a clue to the direction of the wave was explained. The instrument by which the phenomena were illustrated consisted of an oak tunnel, 20 feet in length and 4 inches square, with side limbs. The lid was in sections and hinged, to enable small obstacles to be placed in the channel prior to the experiment, and the depositions of charred dust to be examined afterwards. One end of the main tube communicated with a chamber which was filled with a mixture of air and coal gas in explosive proportions. It was demonstrated that the concussion caused by firing the gaseous mixture brought about the ignition and combustion with explosive violence of fine coal dust or lycopodium powder suspended in the air in the tube. The phenomenon did not occur with some varieties of coal; but no evidence was forthcoming to prove a relation between chemical composition and explosive properties.

Professor Thorpe afterwards exhibited an invention of Mr. Liveing, a student of the Royal School of Mines, for the detection and approximate estimation of fire-damp or gas in air. The apparatus consisted of two small chambers, in which were platinum wires of equal electrical resistance. The one chamber was filled with pure air; while the air to be tested was drawn into the other. An electric current was passed through the wires, when, if fire-damp was present in the air under examination, the wire in that chamber glowed with greater intensity than the one in pure air; the amount of light augmenting with an increase in the quantity of fire-damp. The rays from each wire, concentrated by lenses, were received on opposite sides of a screen, which was moved on a graduated scale until equal illumination was obtained on both sides. The scale was empirically graduated and marked in percentages of fire-damp. It was stated that one-fourth per cent. could be detected with certainty by this apparatus. An improved safety-lamp constructed for the same purpose, and not for illuminating, was also exhibited. These instruments should prove useful in purifying-houses and other buildings of a gas-works.

REGISTER OF PATENTS.

Gas-Engines.—Hughes, F.; communicated from F. Cordenous, of Padua, Italy. No. 2976; Feb. 18, 1891.

This invention, relating to gas-engines, refers to a rotary engine consisting of three cylinders having a circular motion around the shaft, and furnished with pistons receiving the usual to-and-fro motion; the whole engine being so arranged and constructed that two strokes are produced at each explosion, instead of four strokes as in gas-engines hitherto constructed.

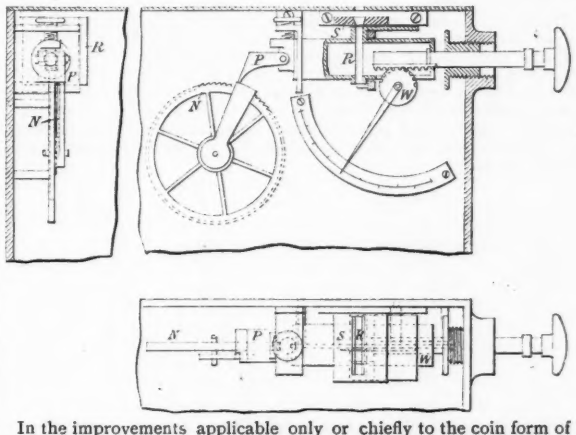
The rotary motion of the whole of the engine, with the exception of the framework, is produced by the six explosions of the three cylinders; and it is communicated to the motor shaft by the aid of centrifugal force—the three cylinders and their valve gears acting as a fly-wheel. Upon the two pedestals, arranged on each side of the engine, are rigidly bolted two stop-pieces, against which the heads of the connecting-rods abut in turn; so that, as the explosion occurs at this moment, the corresponding cylinder receives an impulse, and is caused to rotate while the piston remains momentarily a fixture. The motor shaft carries two cams firmly fixed together, one of which actuates the slide-valves distributing to the cylinder the charge exhausted from a suitable gas-conduit and from the atmosphere by a valve actuated by the other cam. The products of combustion are allowed to escape through any suitable arrangement of pipe; and the ignition is effected by an electric spark produced, when the circuit from a battery is completed by means of suitable contacts, between the two pointed ends of two rods separated at the time.

Gas Cooking and Heating Stove.—Billing, C. E., of High Holborn. No. 3167; Feb. 21, 1891.

This invention—which relates to a gas cooking and heating stove, so arranged that roasting, boiling, and baking may be accomplished at the same time by the aid of one burner so constructed that the heat flames burn vertically and horizontally simultaneously—was sufficiently described in the JOURNAL for June 9 last year, p. 1127.

Prepayment Gas-Meters.—Cowan, W., of Edinburgh. No. 3575; Feb. 27, 1891.

This invention (which relates to improvements in prepayment gas-meters of the coin-freed type, and in part applicable to non-prepayment gas-meters) consists of improvements in and modifications of, as well as of additions to, the patentee's previous invention No. 11,537, of 1890. One portion of the present invention is an improved method of keeping the lever opening in the side of the supplementary valve-box gas-tight. Another part has reference only or chiefly to the coin form of prepayment meters, as described in theformer specification. The improvements (like thos of the previous invention) apply both to wet and dry meters.



In the improvements applicable only or chiefly to the coin form of prepayment meters, the patentee proposes to dispense with most of the mechanism for discharging the coin into the money-box and for driving the pawl P of the prepayment wheel N, which was described in the previous specification; and he substitutes therefor more simple means for effecting these purposes. The arrangement of the index and the prepayment wheel, together with the means employed for opening, keeping open, and closing the supplementary valve, and also the price changing platform and its appendages, will be practically the same as is described in the previous specification. But in this invention the slot into which the coin is dropped is formed in a moveable slot-piece R, which is joined or linked at its side or end on to the pawl P of the prepayment wheel N. The slot-piece will also be so joined at its other side or end to near the extremity of the pusher-rod, that all three—pusher, slot-piece, and pawl—will move forward and return backward together. But in order to make this united action entirely dependent on the presence of the coin in the slot, an opening is made through the slot; and through this the pusher will pass unimpeded and without result if no coin be present. In the event, however, of a coin being in the slot, the opening is closed or obstructed, with the result that the pusher in moving carries with it the slot piece, the coin, and the pawl, and so drives forward the prepayment wheel.

The slot-piece R, which is capable of a forward and backward movement, is suitably guided in brackets secured to the inside of the index-box; and it is so placed that, when in its normal position, the upper or inlet end of the slot is immediately under a corresponding opening formed in a fixed guard-plate S, whose opening is immediately under the usual opening or slot in the cover of the index-box; the guard-plate being for the purpose of preventing the coin from being surreptitiously withdrawn after the pusher has been operated—this being assisted by the tail piece or plate formed on the slot-piece. The slots are so

arranged that, on a coin being passed through the outer one, it at once enters the main slot, in which position it is held until the pusher has (by pressing against the coin,) given it the necessary support, by an independently fixed guard. This may take the form of one or more pins mounted directly over the entrance to the money-box, so as to cover enough of the bottom or outlet end of the slot to prevent the escape of the particular size of coin it is necessary to employ. A coin of smaller size will not, however, be obstructed by the guard, but will fall at once through into the money-box. When the pusher is operated, by being pressed inwards, its pressure against the coin is sufficient to maintain the coin in position after the slot has been moved away from the supporting guard or pins; but in the event of any attempt being made to withdraw the pusher, and hence relax the pressure on the coin before the proper point has been reached, the coin will at once fall through the slot into the money-box. When, however, the pusher has moved the slot-piece R and pawl P the required distance, and is then withdrawn ever so little, the pressure upon the coin is relaxed, and the coin then falls into the money-box, and is no longer available to give power to the pusher.

It may sometimes happen (either accidentally or intentionally) that a coin coated with fatty or other adhesive material may be passed into the slot, and be retained there by adhesion between it and the surface with which it is in contact. In order to prevent such an occurrence, and a fraudulent use of such a possibility, the slot is ribbed, or it may have pins, so as to reduce the contact between the coin and the slot to the least possible amount of touching surface, as shown.

Another part of this invention consists of a method of adapting the prepayment mechanism to changes in the price of gas. It will be noticed that the length of travel given to the pusher determines the distance the pawl P will traverse, and consequently the extent of the movement it will give to the prepayment wheel N. The patentee therefore provides the pusher with an adjusting arrangement W, which, on being operated, will increase or decrease the travel, and so alter the movement the pusher gives to the wheel N, which in this case has a stationary platform. The arrangement W is composed of an adjustable screwed nut, accessible to the gas official only, and which may be screwed in or out of the boss of the index-case; the exact distance being regulated on a scale by means of a pointer, which is geared by means of a spur-pinion with a spur-rack formed on the end of the pusher, and so makes the change a very simple operation.

In some instances a "stop" may be employed, instead of a valve, to terminate the supply of gas, by offering an obstruction to the progress of the meter's mechanism. For this purpose a "stop lever" may be employed, under the control of a grooved disc or band having a notch or opening in it, or else of an arm projecting from the prepayment-wheel.

Gas Lighting and Extinguishing Apparatus.—Adkins, W., of Birmingham, and Melville, J., of Pall Mall, S.W. No. 5417; March 26, 1891.

This invention refers to apparatus for turning on, lighting, and turning off gas-lamps at predetermined times. It primarily consists of ordinary chronometric mechanism, operating a time disc carrying adjustable cam-tappet devices for releasing a toothed or star wheel; the latter being moved (when released) by a separate or secondary wound spring or its equivalent—for example, by a weight. The star-wheel acts on "anchor pallets," which rock an upper arm for turning the gas off or on; and it makes contact for igniting the gas by an electric spark.

Fig. 1.

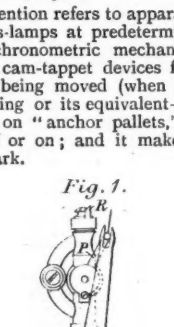
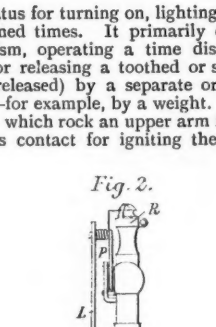


Fig. 2.



The illustrations are a front and side view of the appliance.

A is a casing containing clock-work mechanism of ordinary character, capable of rotating the time-disc B (fixed to the clock-spindle C) one complete revolution every twenty-four hours. The time-disc is divided into 96 divisions, to represent quarter hours, and is formed with teeth at the periphery. D D^1 are the cam-tappets; the inner ends being forked or slotted and embracing the spindle C, and the outer ends having teeth with springs to hold them normally in between the teeth on the time-disc, so that the tappets may be shifted to any position around the time-disc and there retained. E are handles for moving the tappets. F is the gas-supply pipe passing from below; and being continued on each side of the clock through an annular passage, it again joins into a vertical tube leading to the gas-burner. Supported on the same spindle as the time-disc, is the star-wheel G, the ratchet-wheel H, and a spur-wheel J, all of which are fixed together, but are free to turn together independently of the clock mechanism. K is the secondary spring case, the spindle of which, by means of a ratchet-wheel and pawl, drives a pinion gearing with the spur-wheel J. Above the clock is pivoted a rocking-arm L, having its lower end bifurcated so as to form anchor pallets, which are acted upon by the teeth of the star-wheel. M is a jointed pawl for controlling the ratchet-wheel H; and there is a projecting pin on the pawl M, to be acted upon by the inclined heads of the cam-tappets. The ratchet-wheel H has (say) twice the number of teeth on the star-wheel G; and therefore, when it is allowed to move through the space of one tooth, the star-wheel will cause the lever arm L to rock in one direction; and on the ratchet H again moving through the space of another tooth, the arm will be rocked in the opposite direction.

The plug of the tap controlling the supply of gas is provided with an arm P, having a projecting pin engaging in a slot in the arm L, by which the tap is operated. On the pin is a spring wire conductor having an upper bent end; and on the burner is an insulated conducting ring R—both wire and ring being in connection with an electric battery and coil apparatus.

The operation of the apparatus is effected as follows: The attendant sets the cam-tappets D D^1 in the proper positions relatively to each other, and adjusts the distance of the tappet D^1 from the pin of the pawl M. The clockwork in the case A is then wound by a handle at the back; also the secondary spring at K is wound up. The apparatus will now act automatically. On the cam-tappet D^1 (carried by the revolving time-disc) passing the pawl pin, the inclined edge of the tappet will force the pawl away from the ratchet-wheel H; and the secondary spring will act through spur-wheels and rotate the wheels G H the space of one tooth of the ratchet, and rock the arm L, turn on the gas-tap by the arm P, and immediately afterwards bring the wire past the contact-ring R, causing an electric spark, and thereby lighting the gas. The continued rotation of the dial will, at a fixed time (according to the distance which the tappets have been set apart), bring the tappet D against the pawl pin; and the mechanical movements already described will again occur, excepting that the arm L will move in the reverse direction, and the gas will be turned off.

Gas-Fittings.—Fairbank, J., of Hoxton. No. 6839; April 21, 1891.

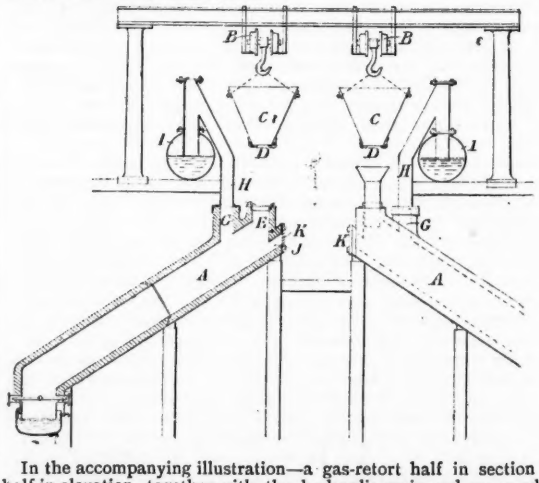
This "invention" in gas-fittings has for its object the prevention of waste of gas while alight and the escape of gas when not burning. The cock is constructed with locking devices, by means of which the gas is turned off to the lowest limit and locked there, if it is desired to leave it burning; or if it is to be extinguished entirely, the cock is pressed past the first lock on to a second, where it is firmly fixed, and cannot be knocked on by accident or turned too far. In order to apply the idea to existing fittings; a metal spring is provided, having notches, grooves, or stops at one end, and a clipping apparatus at the other end for securing it to the gas-pipe. The spring presses upon the tap, and holds it firmly in the position in which it is placed, and answers in all ways the purposes above described.

An Electro-Magnetic Gas Controller.—M'Laren, J., of Edinburgh. No. 6908; April 22, 1891.

This instrument has been designed to automatically turn up the gas light in any building where the electric light is used, whenever the latter fails. A valve is placed in a convenient part of the gas service-pipe; the spindle which is fixed to the valve passes through a stuffing-box, where a small iron armature is fixed to it; and on a small frame which connects the whole instrument together, two electro-magnets are held in position by screws. When the electric light is on, a strong magnetism is produced in the cores of the electro-magnets, which immediately draws the armature towards them; and the valve, being fixed to the same spindle, is also drawn down, and therefore closes the gas-valve. There is a bye-pass valve arranged so that, when the main valve is closed, the bye-pass supplies a sufficient quantity of gas to keep a "peep" in the burners which are to be operated by the apparatus.

Gas-Retorts.—Cotton, W. T., of Brixton, S.W., and Crowther, E. F. B., of Withington, Lancs. No. 6947; April 22, 1891.

This invention in gas-retorts is designed (1) to enable the gaseous products to be taken from the top of the retort to the hydraulic main; (2) to enable the coal to be fed directly into the retort from an overhead tram or railway without having to lift the coal or use a shovel; and (3) to enable the retorts to be effectually cleaned of any coke or carbon which may cling thereto.



In the accompanying illustration—a gas-retort half in section and half in elevation, together with the hydraulic main and an overhead tramway by which coal may be conveyed to the retorts—A is the retort; and B, an overhead tram or railway, from which trucks C containing the coal to be carbonized are suspended, and can be conducted

on the rails to the retorts. D are doors in the bottom of the trucks for discharging the coal. E is the aperture in the retort for charging it with coal, which can be regulated in its descent into the retort by partially or entirely opening the doors D, while a funnel or hopper may be used to facilitate the charging of the retort. After the retort is sufficiently charged with coal, a fire-clay slab or lid is placed over the aperture E to keep in the heat; and any suitable metallic door or dome may be mounted over it to make a gas-tight joint. In proximity to the aperture E, is another aperture G, through which the crude gas produced in the retort ascends into the stand-pipes H, and is then conducted through the dip-pipes into the hydraulic main I. In the end of the retort, and underneath the aperture E, is another aperture J, through which an iron rod or poker may be inserted to remove any coke or carbon that may adhere to the inner walls after the retort has been discharged. This aperture is provided with a lid K, to be opened when the retort has to be cleared out.

Spreading Disc for Gas-Burners.—Ephraim, A., of Berlin. No. 7269; April 27, 1891.

Alluding to his proposal, the patentee says: As is well known, gas-flames give out a yellowish light if the heat of combustion is not sufficiently high for heating to incandescence the lighting materials contained in the combustible gas—more especially the carbon carried away; and this heat may be increased by spreading or broadening them in order to afford the air better access. Moreover, it is well known that (as in the Welsbach incandescent gas-light) the illuminating power of the flames may be considerably increased by the insertion of incandescent bodies presenting a great power of radiating light; but the fabric of these lamps is too liable to break to be used in small gas-lamps.

The present invention therefore is intended to enable the advantages of the spreading discs to be combined with those of solid incandescent bodies in the flame; use being made of discs of asbestos. Discs possessing parts of metal—for instance, platinum—as solid incandescent bodies have already been employed for this purpose; and use has heretofore been made of discs of asbestos saturated with a solution of a platinum salt. Experience has, however, demonstrated the impossibility of uniformly distributing the platinum in the asbestos mill-board; and the incandescent disc made in this way subsequently shows a spotty light. The same defective result is produced in the case of all the metallic salts that may be employed which also possess the property of liberating the metal in the heat. In contradistinction to this, the patentee proposes to use, in the preparation of the asbestos mill-board, a chemical compound which is not liable to be decomposed in the heat—namely, a solution of silicate; and water-glass appears to be best adapted. If then, by the action of the heat, the mill-board is destroyed, a mass as hard as stone is produced, which constitutes an excellent incandescent body.

Gas-Engines.—Pinkney, C. W., of Smethwick. No. 7313; April 28, 1891.

This invention in engines worked by the explosion of gas has reference more especially to "four-cycle engines." To render such engines capable of working with less shock than hitherto, the combustion chamber is made conical or lessening in capacity as it recedes from the working cylinder; the smaller or rear end being turned down or round in a curve towards the gas inlet and igniter passage. The charge, as it thus enters the combustion chamber, easily spreads out and clears the chamber of burnt gases; presenting the pure or practically pure gaseous mixture to the igniter. The ignition thus commences at the smaller end, and spreads without shock to the larger end of the combustion chamber. The main body and spindle of the valve are made of a non-oxidizable metal or alloy—such as brass or bronze; and there is attached thereto (preferably by screwing into the end of the spindle) a hard metal piece, which bears upon the seat, and acts as the valve proper. The igniter-tube extends upwards from the combustion chamber into the chimney, into which opens the nozzle of a Bunsen burner, the flame of which plays upon and heats the igniter-tube. This burner is made telescopic, so that the part secured to the chimney can be moved with the chimney attached to the combustion chamber or other suitable part; and in this way, by a screw or otherwise, the chimney and the part of the burner carried by it can be moved relatively to the ignition-tube, so as to allow of the lamp flame playing upon any part of the igniter-tube according to the period of ignition desired.

The governing is preferably effected by an arrangement analogous to that described in patent No. 1218 of 1885; but instead of being fitted in the way there explained, it works off the second motion shaft by means of a cam; the lever or pusher which acts upon the valve-opening arrangement, and is provided with the incline described in the 1885 specification, being carried by a lever arm centered to any suitable part of the engine, and being provided with springs, which keep it in proper position, and enable the governing arrangement to be used in any position. One of the springs can, by means of a screw, be employed as a regulating spring; so that, by operating the screw, the speed of the engine is regulated without stopping it.

To ensure the gas and air being properly mixed, they enter directly at or about right angles to each other—the gas flowing round an annular passage surrounding the inlet-chamber beneath the inlet-valve, and passing from this passage through a number of small openings into the inlet-chamber; the air entering into the inlet-chamber also from an annular passage surrounding it, so that it cuts across the incoming streams of gas. To ensure the gas being cleared out of the annular gas passage, the gas supply-valve is closed just before the piston of the working cylinder reaches the end of its charging stroke, so that air alone then enters and passes by a communicating passage leading from the air passage into the gas passage to clear it of gas. Gas cannot pass down the communicating passage, owing to the vacuum necessary for charging purposes in the inlet-chamber being greater above the air-inlet passage to the chamber than below it, which can be effected by contracting the space above the air-inlet passage.

To prevent or lessen the noise arising from the inrush of air when charging, there are provided in the air-inlet pipe or passage baffles, against which the air strikes, and so is diverted or broken up, and noise is prevented or greatly lessened.

Gas-Engines.—Southall, J., of Worcester. No. 9038; May 28, 1891.

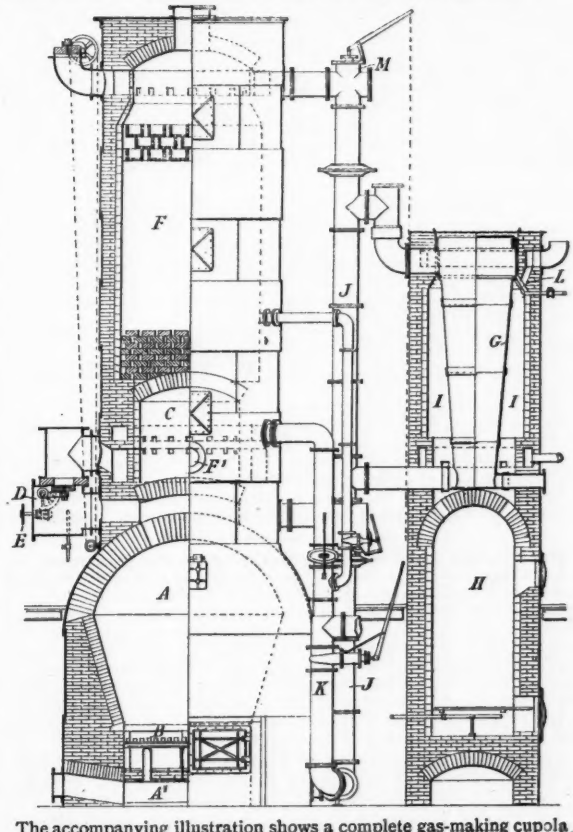
The main object of this invention in the matter of gas-engines relates to making the larger sizes in such a way that they may be started with compressed air controlled by a hand-lever. To accomplish these objects, a valve is arranged so made as to perform the double duty of admitting the gas and air to the cylinder, and also of letting out the products of combustion during the exhaust stroke; and the front end of the cylinder is closed in, as in a double-acting steam cylinder—using on this front end a special arrangement of valves, so that it acts simply as an air-pump, and is available for starting—the clearance space in the front end of the cylinder being as small as practicable. The front end of the cylinder is provided with a port, which connects with a chamber in which are two valves, working in the same manner as in a force-pump, excepting that they are so made that, by means of a lever in the chamber working on a spindle passing air-tight out through one side of it, they can be controlled by an exterior hand-lever, so that whilst the suction-valve is on its seat, the delivery-valve can be raised off its seat, or *vice versâ*; or if the lever is put in a neutral position, both valves are free to rise and fall.

Supposing the engine is running with the lever in this last-named position, the front space of the cylinder will be acting as an air-pump, drawing in air through the suction-valve, and forcing it up through the delivery-valve, thence into a reservoir provided to receive it. This is allowed to go on until a pressure-gauge on the reservoir shows the desired pressure has been reached. The lever is then moved, and fixed so as to hold the suction-valve open, and allow the piston to simply draw in air and expel it without effort; the delivery-valve serving to retain the pressure in the reservoir.

Water-Gas Apparatus.—Springer, T. G., of Chicago, Ill., U.S.A. No. 19,641; Nov. 12, 1891.

This invention has reference to "apparatus wherein steam is decomposed into hydrogen and carbonic acid gas, by passing it through a body of incandescent carbon in a closed chamber, and caused to mix with vaporized oil or liquid hydrocarbons; the mixture being finally passed through a chamber (called a fixing chamber), containing refractory material in a highly-heated state, wherein the combined gases are rendered a fixed illuminating gas."

In carrying out the manufacture of such gas, says the patentee, it is found desirable to provide for the treatment of oils of different specific gravity—that is to say, a heavy oil will require a different heat to properly vaporize it from a lighter oil. It is expedient, therefore, to make provision for the regulation of the oil-vaporizing portion of the apparatus independent of the water or steam gasifier, in order to suit the requirements of each oil under treatment, whatever may be the specific gravity. The object of the invention is "to provide for such regulation, and thereby to render the apparatus available under all circumstances, no matter what oils are submitted for treatment."



The accompanying illustration shows a complete gas-making cupola, with the present improvements applied thereto.

A is the cupola furnace or generator (with suitable doors for charging, stoking, &c.), wherein steam is decomposed. Beneath the grate-bars B is an enclosed ash-pit A^1. Within the ash-pit are air-supply pipes for blasting the fuel in the furnace and getting up a heat. Above the furnace is a combustion chamber C, having communication with the furnace through the valve-box D. This box is furnished with a flap-valve opening downwards, operated by a sector rack keyed on the rock-shaft end outside the valve-box. A worm gears with the rack

upon a shaft turning in bearings upon the outside of the valve-box; and the hand-wheel E operates the worm. F is the fixing chamber, situated above the combustion chamber C, containing refractory material, and shallow perforated trays holding lime for purifying the gas.

A purge-valve is provided for allowing the escape of products of combustion during the heating up of the fuel in the furnace to an incandescent state. J is what is called the hydrogen-pipe, which, for convenience, is carried up the whole height of the cupola; but is blocked, so that there is no passage from end to end of the pipe. At its lower end the pipe communicates, by a three-way junction, with the blast-pipe K, and with the ash-pit. The blast-pipe has communication with the combustion chamber C, as well as with the ash-pit. The admission of air to the combustion chamber is desirable for completing the combustion of the gases generated during the blasting of the fuel in the furnace or generating chamber. Should the combustion be still incomplete in the chamber, air is admitted to the fixing chamber F at F^1, where the remainder of the products of combustion (if any) can be consumed. G is the oil-vaporizing retort (made in sections of cast rings or tubes, hooped around at the joints) situated in a separate setting alongside the cupola, but communicating with it at its lower end by a pipe which delivers the water gas from the cupola through the hydrogen-pipe J. H is the furnace, which delivers its heat through apertures in the dome to the space I around the retort G; whence the products of combustion, after heating the retort, pass to the escape-flue. L is a ring oil-pipe leading from a suitable supply, for delivering oil in a thin stream upon the inner surface of the retort. The retort is connected with the upper portion of the pipe J, and thereby with the upper part of the fixing chamber F of the cupola. M is a valve for controlling the passage from the retort to the chamber F, as required. There is an air-blast pipe below the fire-bars of the furnace H, by means of which the heat of the furnace, and consequently of the retort G, may be increased, or allowed to diminish, in accordance with the requirements of the oil to be vaporized. By this means, the oil gas within the retort can be brought into the most favourable state for combining with the hot water gas as it comes from the cupola and mixes with the oil vapours in the retort, before passing to the fixing chamber.

The action of the apparatus is as follows: The furnace A, being charged with fuel, the air-blast from the pipe K is first admitted by the ash-pit. The blast carries up the products of combustion from the furnace through the valve-box D and its valve, which is open to the combustion chamber C, where they meet a current of air. Thence the heated products pass to the chamber, rendering the refractory material and lime troughs therein very hot. From the chamber F, the waste products of combustion from the cupola escape through the purge-valve into the open air. When sufficient heat is obtained in the cupola, the air-blast is cut off, and all the valves are closed in the air-pipe; the purge-valve being also closed. Steam is then admitted into the space above the furnace A; and being under high pressure, it is forced downward through the fuel to the ash-pit, and being converted into hydrogen and carbonic oxide, the steam enters the base of the hydrogen-pipe J, and passes upwards through it, and thence into the retort G. At the same time, the air-blast is turned into the furnace H; and the heat therefrom, regulated (as explained) by the power of the blast, impinges upon the exterior of the retort, so as to vaporize the oil flowing from the pipe L. The mixed gases and oil vapour pass together to the chamber F, thence down through the lime, which takes up any carbonic acid present, and down through the refractory material, thereby being converted into a fixed illuminating gas.

APPLICATIONS FOR LETTERS PATENT.

4969.—THORPE, H., "Gas-brackets." March 14.
4981.—DOWSON, J. E., "Gas and oil engines." March 14.
4993.—O'GORMAN, M., "Gas-regulators." March 14.
5032.—GLEGG, A., "Gas-fires." March 15.
5108.—FISH, R., and SMITH, W., "Regulating liquid seals in gas-washers and the like." March 15.
5122.—TAYLOR, J. W., and KADERMACHER, J., "Water and other fluid meters." March 15.
5198.—LAYCOCK, J., and CLAPHAM, S. B., "Purification of coal gas." March 16.
5226.—ZEITSCHEL, B., "Gas-lamps." March 16.
5228.—BOULT, A. J., "Wet gas-meters." A communication from G. W. Gay. March 16.
5239.—YEADON, J. A., and ADGIE, W., "Revivifying gas lime (sulphide of calcium) and other analogous materials." March 16.
5428.—PADGHAM, G. H., "Gas and petroleum engines." March 19.
5444.—PAYNE, F., and FROST, T., "Gas and oil motors." March 19.

The Purchase of the Rhyl Gas-Works by the Commissioners.—A public meeting of ratepayers and owners was held at Rhyl on Monday last week, for the purpose of considering a resolution in favour of an application by the Improvement Commissioners to the Local Government Board for sanction to borrow £35,000 for the purchase of the gas-works. Mr. W. E. Williams, the Chairman of the Commissioners, presided; and, in his opening remarks, argued that it would be one of the best things that could happen if they were empowered to acquire the works. Captain Keatinge moved the resolution expressing approval of the application. This was seconded by Mr. P. Mostyn Williams; and was carried, with very little opposition.

Armagh Gas Company.—In their annual report, which was submitted for adoption at the meeting of this Company held yesterday week, the Directors referred, in the first place, to the increased price which they had had to pay for coal. In 1889, they stated, coal advanced 1s. per ton; in the second six months of 1890, it was 2s. 6d. additional; and in 1891, all the coal used was at this high figure. This exceptional rate incurred an outlay of about £400 per annum, after the price of gas had been reduced to 4s. 2d. per 1000 cubic feet. To assist the Town Commissioners in improving the public lighting of the streets, the price charged to them was further reduced to 3s. 6d. per 1000 feet. The Directors recommended a dividend at the rate of 1s. 9d. per share, free of income-tax, absorbing £945. The report was adopted.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

Standards of Light.

SIR,—I have been considering the vexed question of standards of light, and trying to evolve something new, but have returned to the much-abused candles for a basis. An improvement in the present method of testing might be effected by multiplying the number of candles used; two being insufficient to correct for the irregularities of burning, &c. With an increased number—say four, six, or eight—a great regularity would possibly accrue; and a single reading in the centre of the bar would suffice; while one tester might read and another check it without a chance of dispute as to the reading.

I have tried numerous experiments with four candles, by using an arrangement having four spring sockets, soldered to a strip of brass, in a straight line, at the usual centres (about 1¼ inch); and the results are most satisfactory.

The advantages of the four-candle tests are—

1. The disc being brought nearer the centre of the bar, where the divisions are wider, it is far easier to read; and as the difference is so conspicuous, it is difficult to make a mistake of even a single decimal point.
2. The variations in the readings do not exceed more than 3 or 4 points all through a test.
3. The time waiting for the candles to consume sufficient sperm to balance over the centre, when ready to commence a test, is only one-half as long as required with two candles.
4. The irregularities of each candle are corrected almost imperceptibly; and the 80 grains of sperm are more nearly adhered to than are the 40 grains with two candles.
5. The illuminating power is more accurately obtained.

LIGHT.

March 26, 1892.

Regulating the Seal in, and Drawing the Tar from, Hydraulic Mains.

SIR,—I am surprised at Mr. Hislop's letter in your last issue, where he says that the illustrations of his patent "possess no features of similarity" to those in the JOURNAL for Dec. 16, 1879, "excepting that in both the connecting-pipe is attached to the bottom of the main." Has Mr. Hislop examined the number of the JOURNAL mentioned? for the connecting-pipe is shown attached to the end of the main as well as to the bottom; but that was merely to suit existing circumstances. There is a closer resemblance between the illustrations than the above—viz., the method of regulating the seal. In the 1879 illustrations, this is done by raising or lowering a screwed piece on the top of the upstand pipe; while Mr. Hislop's plan is a piece fitted close over that pipe, and raised or lowered by a screw, as required. In every way the result is the same; and one wonders at the patent, when, as Mr. Ellery says, so many similar regulators, "even to some small details," are in use.

J. H.

March 24, 1892.

The Action of Gasholder-Tank Water upon Cement.

SIR,—I am about to put down a new gasholder, the tank for which will be 25 feet deep. About one-half of its depth will be in the new red sandstone rock, which I intend to have sawn-faced, and any fissures which may occur plugged. In front of the rock wall, I purpose building a 4½-inch brick ring in cement, with a cavity of 1½ inches between, filled in with Portland cement grouting. As the water in the tank will eventually become ammoniated, I have some misgivings as to whether or not its action on the cement may, in course of time, cause it to become leaky. I shall therefore be glad if some of your readers will express their opinions and experience in connection with tanks so constructed.

AN OLD SUBSCRIBER.

March 26, 1892.

Fourness's Gas Patents.

SIR,—It may interest the above-named inventor, as well as others of your readers, to learn that the Gaseous and Liquid Fuel Supply Company, Limited, hold patents for injecting oil under pressure for the purpose of enriching generator gas. Further, that contracts were made so long as 3½ years ago to erect plants for generator gas to be enriched by oil injected into retorts through which the gas passed on its way to the purifying plant. It was found that, in injecting oil into full-sized retorts, the difficulty was to prevent leakage in the absence of the graphite which forms in coal-gas retorts. There is therefore no patentable novelty in this arrangement.

D. H. NOAR, Secretary,
The Gaseous and Liquid Fuel Supply Company, Limited.

Manchester, March 25, 1892.

Sales of Shares.—Among some miscellaneous shares sold by auction at Portsea last Wednesday week, were two £53 fully-paid shares, "A" series, in the *Portsea Gas Company*, which realized £112 each; two £50 ditto "B" series, which produced £106 each; and ten fully-paid £10 original shares in the *Portsmouth-Water Works Company*, for which £28 2s. 6d. each was obtained.——Five £100 bonds in the perpetual debenture stock of the *Lowestoft Water and Gas Company* (bearing interest at the rate of 4 per cent. per annum) realized, at a sale by auction on the 16th inst., £112 and £113 each; and ten fully paid-up preference shares of £10 each (receiving interest at the rate of 5 per cent.) sold equally well.——The following new shares in the *Maidstone Gas Company* have been disposed of at the prices stated: Four lots of £100 consolidated stock fetched £201 and £202 each; six £50 do. were disposed of at prices ranging from £100 to £102; four £25 do. realized £51 and £52 each; and two £30 do., £63 each.——Four lots of five £10 ordinary 7 per cent. shares in the *Maidstone Water Company* have been sold for £17 10s. each.——Twenty £10 shares in ths *Crays Gas Company* have lately changed hands at £19 15s. each.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Bills last week:—

Bills referred to a Select Committee consisting of Lord Basing (Chairman), Earl Faversham, Lord Colchester, Lord Seaton, and Lord Revelstoke; to meet on Thursday, March 24: Llanbradach District and Aber Valley Water Bill; Pontypridd Water Bill; Rhymney Valley Gas and Water Bill; Tredegar Local Board Water Bill; Western Valleys (Mon.) Water (Gas Purchase) Bill.

Bills referred to a Select Committee consisting of Earl Lauderdale (Chairman), Earl Romney, Lord Camoys, Lord Monteagle of Brandon, and Lord Hillingdon; to meet on Monday, March 28: Glasgow Corporation Water Bill; Newport Corporation Bill; Swansea Corporation Water Bill.

Bills reported, with amendments: Barrow-in-Furness Corporation Water Bill; Bradford Corporation Water Bill; Cleator Moor Local Board (Gas) Bill; Liverpool United Gas Bill.

Bills read the third time and passed: Barrow-in-Furness Corporation Water Bill; Bristol Gas Bill; Cleator Moor Local Board Bill; Kilmarnock Corporation Water Bill.

Opposition withdrawn: Oxford Gas Bill; Western Valleys (Mon.) Water (Gas Purchase) Bill.

HOUSE OF COMMONS.

The following progress was made with Bills last week:—

Further Standing Orders complied with: Rhyl District Water Bill.

Bills read the first time: Bristol Gas Bill; Kilmarnock Corporation Water Bill.

Bills read a second time and committed: Mold Water Bill; Stamford and St. Martin's Stamford Baron Gas Bill.

Bill withdrawn: Barry and Cadoxton Gas and Water Bill.

Petitions against the Birmingham Corporation Water Bill were presented from the Corporation of Worcster and owners of property in Birmingham.

Petitions against the following Bills were withdrawn:—

Exmouth and District Water Bill, from the Budleigh Salterton Local Board.

Mold Water Bill, from the Hawarden District Water Company.

HOUSE OF LORDS COMMITTEE.

(*Before Earl* RAVENSWORTH, *Chairman; Viscount* BANGOR, *Lord* WINDSOR, *Lord* ZOUCH OF HARYNGWORTH, *and Lord* SHUTE.)

BARROW-IN-FURNESS CORPORATION WATER BILL.

This Bill, by which the Corporation of Barrow-in-Furness seek power to obtain an additional supply of water, and to construct the necessary works, came on the 15th inst. before a Select Committee constituted as above. It was opposed by the Dalton-in-Furness Local Board, on the ground that proposed further supply is not needed.

Mr. PEMBER, Q.C., and Mr. FREEMAN appeared for the promoters; Mr. SAUNDERS, Q.C., and Mr. CLIFFORD represented the opponents.

Mr. PEMBER, in his opening statement, described the vicissitudes experienced by the town and port of Barrow. He said that in 1842, Barrow was a hamlet of ten or a dozen houses; whereas now it had a population of 65,000. When the town was incorporated in 1868, the water supply was derived from wells. In 1864 the Furness Gas and Water Company was formed; and they took over a reservoir belonging to the Furness Railway Company, and another belonging to Messrs. Sneider and Hannay, the founders of the Hematite Steel Company, the establishment of which laid the foundation of Barrow's prosperity. In 1872 the Barrow Corporation acquired the Furness Water Company's powers, and made two other reservoirs—the Pennington and the Poakabeck—at a cost of £60,000; the original estimate having been £28,000. The Corporation in 1874 obtained powers to make the Harlock reservoir, and to raise the banks of the Poakabeck reservoir in order to increase its capacity. These works had never been carried out, because in the following year a great check was given to the iron trade; and the consumption of water fell off from 737 million gallons to 595 million gallons in 1875, and to 544 millions in 1885. With the revival of trade, the Corporation obtained a ten years' extension of time for carrying out the works. Once more, however, there was another fluctuation in trade, and the consumption of water again dropped, and the powers were allowed to lapse. In 1889 the Barrow Corporation applied to Parliament for the purpose of tapping the head waters of the Duggan, and for a further extension of time. But the House of Commons held that the Corporation had not then exhausted their existing powers; and the Bill was thrown out. The years 1889 and 1890 were very wet ones, and the supply was fairly adequate; but 1891 being a dry year, the supply was short, both for domestic consumption and trade purposes. The present daily demand was 2,700,000 gallons; and the daily supply, 2,500,000 gallons. The Ulverston Local Board, whom the Barrow Corporation supplied with water, opposed the Bill mainly on the ground that the existing supply was adequate, or, at all events, if it was inadequate, it was owing to the large quantity of water given to traders. The learned Counsel said he was quite prepared to admit this. He contended, however, that it was as essential to the life of the town that trade requirements should be met as domestic and sanitary needs; because if the trade were not served, the town would cease to exist. The proposed works would increase the supply of water by about a million gallons a day by the enlargement of the Harlock reservoir and the construction of a new one at Holebeck.

Evidence having been given for the promoters,

The CHAIRMAN said the Committee were of opinion that the case for more water had been fully made out.

The opposition of Dalton being mainly with a view of obtaining protective clauses, evidence was given by the Surveyor to the Local Board (Mr. C. C. Smith) and Mr. Pickering, C.E., of Whitehaven. An analysis of the water, prepared by the late Dr. Tidy, was also put in.

The CHAIRMAN intimated that the Committee were unanimously of opinion that powers of inspection should be given to the Local Board, so that they might see that the water supplied to them was properly filtered.

Mr. PEMBER undertook to bring up a suitable clause; and this was subsequently done. It was as follows:—

In order to ensure the purity of the water supplied by the Corporation, they shall effectually filter all water before the same shall be put into their pipes for distribution for domestic purposes. If the Corporation make default in complying with this section, they shall, on summary conviction thereof, be liable to a penalty not exceeding £5 for every day on which such default shall continue after complaint in writing thereof shall have been sent to the Town Clerk; and such penalty may be recovered by the Local Board for the district of Dalton-in-Furness. The Surveyor or other authorized officer of the Local Board for the district of Dalton-in-Furness shall be at liberty to inspect twice in every year such of the filter-beds of the Corporation as shall for the time being be used for the supply of that district upon their giving not less than 48 hours' notice to the Town Clerk of their intending inspection: Provided that, for the purpose of this inspection, the Corporation shall not be required to empty the said filter-beds. Before emptying a filter-bed used for the supply of the said district, the Corporation shall, except in case of emergency, give to the Clerk of the Local Board reasonable notice of the day or days on which the filter-beds should be emptied; and the Surveyor or other authorized officers of the Local Board shall be at liberty to inspect the filter-beds on such day or days.

With the insertion of this clause, and some minor verbal amendments, the Committee passed the Bill.

BRADFORD CORPORATION WATER BILL.

This Bill, which is to authorize the abandonment of certain works authorized by an Act obtained by the Bradford Corporation in 1890, and the construction of new works to enable them to change the points at which water is to be taken from the River Nidd, and also to empower the Corporation to raise for these purposes £100,000 beyond their existing borrowing powers, came before the above-named Select Committee on the 16th inst., and occupied their attention for three days. The only opponents were the Liversedge Local Board.

Mr. LITTLER, Q.C., and Mr. BALFOUR BROWNE, Q.C., appeared for the promoters; Mr. PEMBROKE STEPHENS, Q.C., and Mr. RAM represented the opponents.

Mr. LITTLER, in opening the case, said the Bill was promoted by the Corporation of Bradford in connection with their extensive waterworks. Under ordinary circumstances, he would have had to trouble the Committee at some length with statistics as to the increase in the population of Bradford, the needs of a supply of water, and so on; but it was not necessary to do this to any extent, except so far as was needful to show the importance to the town of Bradford to have the matter before their Lordships settled. The population of the borough had nearly doubled since 1851; and within the last ten years the receipts for water had increased from £83,000 to £118,000. The quantity of water consumed for trade purposes had risen from 1000 million gallons in 1877 to 1706 million gallons; and the outlying consumption, from 339,000 to 510,000 gallons. But during that time, instead of increasing the charge, the Corporation had been lowering it. In 1890 they were forced to the conclusion that their enormous district required a fresh supply; and then they came for power to take the upper waters of the River Nidd. After much discussion, and very careful protection being given to every local interest on the stream, the Corporation acquired the power sought. When this scheme was devised, there was considerable difference of opinion among the members of the Corporation themselves as to the level at which the water should be supplied; and the proposal then presented to Parliament was one which brought water by a line of pipes, by a somewhat more circuitous route than that at present suggested, coming from practically the same point, but at a lower level. The result was that, when the water arrived at the Heaton reservoir, it would have had to be pumped. The cost of pumping such an enormous quantity of water would be a very serious item; and the Corporation came to the conclusion it would be far better to carry out the works at a higher level. This would cost about £100,000 more in works; but if the cost of running the engines for pumping were capitalized, it represented a sum of £300,000. The Corporation would therefore be spending £100,000 to save £300,000, which, of course, would be a clear gain of £200,000. No one in the whole area affected had the slightest objection to that. The only opponents were the Local Board of Liversedge, which was one of the out-townships supplied by Bradford, and which was dependent upon the Corporation for its water supply. Liversedge had been placed in the supply district of Bradford; and at the time they were included, they made no objection. They had had their water supply without incurring any cost for works, and had had no trouble with respect to their water other than that which Bradford had itself had by being at times short—a condition of things which the present scheme was intended to prevent. There were altogether 29 parishes in the district; and out of the whole of them, Liversedge was the only one petitioning, and the only one discontented. The learned Counsel then proceeded to deal with the petition of the Local Board, which alleged that they had been inadequately supplied by the Corporation. If this were so, he said, the Public Health Act gave them the remedy of supplying themselves. It seemed ludicrous to suppose that they were not adequately served, when Bradford and the other townships were content with the same identical supply, and when they themselves were content with it in 1890. Then the Local Board said that other Corporations with mains running through their district were able and willing to serve them; and Batley was specially mentioned. But the Batley Corporation could not give them a supply because their Act had in it a clause prohibiting them from serving any district which was within the supply district of Bradford. The Batley Act was passed in 1871; and Liversedge had been in the Bradford area since 1868. The petitioners alleged that Batley could supply them at a less price. But the fact was that Batley had temporarily more water than it wanted; and therefore would be glad to dispose of it at a price at which it would

not sell it eventually. The Bradford Corporation were glad to sell once for 3d. per 1000 gallons; but now they sold it at 9d., both outside and inside the borough. The Bill would not alter the rate at which water was sold to Liversedge, which was an agreed price of 9d.

The CHAIRMAN remarked that, according to the petition, the opponents had to pay from 9d. to 10½d. per 1000 gallons; and this margin of 1½d. was considerable.

Mr. LITTLER said, whatever the figure was, the Bill did not alter it. [The learned Counsel subsequently explained that, although the cost was to Liversedge 10½d., only 9d. reached the Bradford Corporation. Liversedge obtained its supply through the pipes of one of the intervening Local Authorities, who were also supplied by Bradford; and this Authority charged them a sort of way-leave or toll for the use of the pipes. If, however, the Liversedge people would put down their own main, they would have their water for 9d.] In conclusion, he objected to the *locus standi* of the petitioners; stating that, if the provisions they required to be inserted in the Bill were granted, it would be impossible that it could proceed.

Mr. PEMBROKE STEPHENS remarked that, in order to understand whether or not the petitioners properly had a right to come before the Committee, their Lordships must hear what the position of the parties was, and what the Bill proposed. The measure was an outcome of the scheme of 1890. By the preamble of the Bill for 1890, it was asserted that the water supply had become insufficient for the requirements of the people of Bradford; and by the present Bill the Corporation sought to abandon nine of the works then authorized, and to substitute fourteen new ones.

After considering the matter in private, the Committee decided that Liversedge had sustained its claim to be heard.

The following evidence was then given:—

Mr. *F. Watson*, M. Inst. C. E., the Water Engineer of the Corporation, spoke to the desirability of deviating the works as proposed; and said that, if their Lordships saw fit to reject the Bill, it would mean that the Corporation would have to waste £19,000 a year. After all that had been done, the water supply of Bradford was insufficient; but he disputed the assertion that Liversedge was suffering from an inadequate supply. At the present time, the Corporation had an abundance of water for Bradford and all the out-townships; but he should not be at all surprised if they should at any time run short. If they did, Liversedge would not suffer more than the other townships.

Mr. *Charles Gott*, M. Inst. C. E., who was formerly the Corporation Engineer, gave evidence in support of the Bill. He said the town of Liversedge was incorporated with the Bradford district in 1868, at the request of the inhabitants; there being at that time no other source of supply open to them. The water sent out by the Corporation was of specially good quality, and of great excellence both for domestic and trade purposes; and the Liversedge people obtained all the advantages of it without incurring any responsibility except that of paying for what they actually used. The supply cost 8d. or 9d. per 1000 gallons; and no profit was made upon its sale. Liversedge might get it for less for a short time from some other body; but they would not be able to do so for any lengthened period. If they were released, they should compensate the Bradford Corporation in some way for the expense the borough had been put to in providing the supply. If Liversedge went out of the area, the Bradford rate would have to be increased to make up the loss. For £100 a year Liversedge could put itself in direct communication with the Bradford pipes.

Mr. *Thomas Hawksley*, C. E., explained the various advantages of the scheme before the Committee, as compared with taking the upper waters of the River Wharfe, which, owing to their hardness, were much less suitable for domestic and general purposes. The supply of water to Liversedge was a gain of 1d. per 1000 gallons to Bradford; and the borough was entitled to retain this advantage for all time, unless Liversedge contributed its proportion of the capital Bradford had had to provide. The separation was a question of principle, not of terms.

Mr. *G. H. Hill*, M. Inst. C. E., stated that he considered the Bill an improvement on that of 1890, as it would take water from a higher source, which would save pumping, and tend to reduce the cost of the water. So long as Bradford was able and willing to supply the outlying districts, they ought not to be allowed to withdraw from it.

The CHAIRMAN: The Committee are quite satisfied upon certain points; but what we want to hear is what Liversedge has to say in regard to the difference the price they are obliged to pay Bradford for water makes to them in their competition with other places.

Mr. PEMBROKE STEPHENS said that this would come from the Liversedge witnesses.

In cross-examination by Mr. PEMBROKE STEPHENS, witness said he was Engineer of the Batley Water-Works; and it would be possible to supply Liversedge from the Batley pipes. He could not, however, say what would be the cost of such a supply compared with what Bradford was charging.

The opponents' case was then commenced.

Mr. *S. Kellett*, a member of the Liversedge Local Board, was the first witness. He said that ever since 1878 the supply of water in Liversedge from Bradford had been very scanty. Complaints as to the inadequacy of the supply and its quality were so rife from 1878 to 1882, that it became almost intolerable to be a member of the Local Board. Only evasive answers were received from Bradford in reply to the representations of Liversedge in regard to this.

The CHAIRMAN: The Committee require information only upon two points. We do not want any more evidence about quantity, because it is apparent that the object of the Bill is to increase it; but we desire some evidence upon the purity of the water for domestic purposes. What we particularly wish, however, is to ascertain the truth of the allegation of the petitioners that the traders at Liversedge are placed upon an unfair footing in competition with traders in other districts, in consequence of the price of their water. That is the gravamen of the charge.

Mr. LITTLER asked for the production of a letter of agreement between the Batley Corporation and the Liversedge Local Board for the supply of water by the former.

Mr. PEMBROKE STEPHENS said that for the moment he could not give his learned friend the document asked for.

The CHAIRMAN: It is quite as well to be frank about these matters. I may say at once that we decline absolutely to be parties to breaking the original contract of Liversedge with Bradford. The Committee will not create any such precedent. Now you know where you are.

Mr. *Kellett*, examined further by Mr. PEMBROKE STEPHENS, said the water supplied was dirty, and that the service was only periodical. Owing to being at the end of the supply, the water was dirtier than would be the case if it was at the centre. The Liversedge Local Board charged 1s. 3d. per 1000 gallons.

The CHAIRMAN: I suppose if there was a catch reservoir at Liversedge, the water would purify itself?

Mr. LITTLER: Yes, my Lord. This complaint arises because of the circuitous route they take. In 1888 we offered them an independent main; or, as an alternative, that we should come and serve them with a main. What we offer to Liversedge now is this—that if they put themselves on the same footing as Bradford, we will put them on the same terms of supply as the ratepayers of Bradford. We will supply Liversedge if it chooses to put down an independent main; or we will consider whether we should not contribute towards their pipe, if they make out a case for it.

Mr. PEMBROKE STEPHENS said that Liversedge was not, and could not be put, in the same position as Bradford. They did not touch Bradford. There were intervening districts between Liversedge and Bradford; and they could not lay pipes through those districts. It was Bradford's business, and any other suppliers of water would have attended to it. But they were only willing to deliver water at the boundary, and leave Liversedge to get it into their district as best they could. It would be improper and irregular for him to struggle against an expressed opinion of their Lordships; but the point of his petition dealing with an adequate supply was not disposed of.

After some discussion, the room was cleared. On the re-admission of the parties,

The CHAIRMAN said: We have come to this conclusion: There are two distinct alternatives offered. One is that Bradford will supply water to Liversedge in bulk at the present price, and leave Liversedge to distribute its own water; the other is that Bradford should supply water to a given point to be specified, leaving Liversedge to distribute it by itself. We should like to have, in writing, that which the Bradford Corporation has already offered, and which has been refused, and that which is offered again now. Put that before the Committee, and we will consider it.

Mr. LITTLER: We offer, first, to supply from the high-level works to be constructed under this Act—which will give Liversedge the best and purest supply of water—at a point to be agreed on, or, in default of agreement, to be fixed by arbitrators; secondly, to supply water in bulk to the end of Tong Street nearest Liversedge; thirdly, to purchase the pipes at their present value, and to undertake the supply and distribution of water upon the same terms as prevail in Bradford.

The opponents and their Counsel retired to consider these offers. On their return,

Mr. PEMBROKE STEPHENS said his clients could not accept any of the propositions as submitted. He suggested various alterations which would meet their views; and said that, if they were not agreed to, they must "fight."

As the parties were unable to come to an understanding,

The CHAIRMAN said the Committee were of opinion that the Bradford Corporation had made generous offers, and that they could impose no further obligations upon them.

Mr. PEMBROKE STEPHENS said in that case his clients would withdraw from further participation in the proceedings.

The Committee then passed the preamble of the Bill.

HOUSE OF COMMONS COMMITTEE.

Tuesday, March 22.

(*Before Mr.* HERBERT GLADSTONE, *Chairman; Mr.* W. F. LAWRENCE, *Mr.* A. C. CORBETT, *and Mr.* DUNN.)

LONDON COUNTY COUNCIL (SUBWAYS) BILL.

This Bill—in which the London County Council seek power to extend the system of subways in the Metropolis, and to require gas and water companies, and other persons having authority to interfere with the streets, to make use of such subways, and pay rent therefor—came last Tuesday before a Select Committee constituted as above. It was opposed by the various parties whose interests are affected.

Mr. LITTLER, Q.C., Mr. PEMBER, Q.C., and Mr. FREEMAN appeared for the promoters of the Bill; Mr. BIDDER, Q.C., for the Associated Water Companies and for The Gaslight and Coke Company. The Commercial Gas Company, the Electric Lighting and Telephone Companies, and the London Hydraulic Power Supply Company were also represented in opposition.

Mr. LITTLER, in opening the case, said the Bill was promoted by the London County Council for the purpose of obtaining further powers over subways. As the members of the Committee were probably aware, under certain streets there were now subways which were specially constructed with the object of enclosing all sorts of pipes and wires. These subways the Council proposed to further extend. There was no doubt that the existence of easily-accessible subways would save most of the expense and annoyance to the public at present caused by each gas or water company breaking up the streets whenever they wanted to get to their pipes. The existing subways were in Garrick Street, Southwark Street, Commercial Road East, Queen Victoria Street, Victoria Embankment, Northumberland Avenue, Shaftesbury Avenue, Charing Cross Road, and Rosebery Avenue. Each subway had been so constructed that the sewer was underneath; so that if any accident took place, such as the bursting of a water-pipe, the result would be nothing more serious than the loss of water. These subways cost several thousand pounds per mile; and therefore he thought it was only reasonable that something in the shape of rent should be paid for the use of them.

The following evidence was then given:—

Mr. *A. R. Binnie*, M. Inst. C. E., Engineer-in-Chief to the County

Council, said the gross total length of subways now existing was 7810 yards. The subways in Southwark Street, Commercial Road East, Queen Victoria Street, and Victoria Embankment were constructed under the Act of 1868; but the others were not. The Council had experienced great inconvenience in being able to have bye-laws over one set of subways and not over the other. When the subways were first made, there was considerable doubt about their utility, especially with regard to the earlier ones in Garrick Street and Southwark Street. This doubt was mainly expressed by the Gas and Water Companies. The consequence was that these two subways were not so much used as had been expected, and remained so until the present day. Subways had increased very much since that time; the fears expressed as to their usefulness having been found to be totally groundless, as there was no danger in placing gas and water pipes and electric light wires therein. The Council found that the subways were now extensively used by all companies. They were making them 12 feet wide and 7 ft. 6 in. high; though in some cases they were as small as 9 feet wide and 6 feet high. They were generally laid along the centres of the roads. They were regularly inspected once a day; and therefore it was impossible for leakage to any extent to take place without its being at once discovered. In the subways at present there were 15,043 yards of gas-pipes, 6492 yards of water-pipes, 7614 yards of pipes for the supply of hydraulic power, and 20,887 yards of various other lines of communication. From his long experience, he could say there was a large amount of leakage always going on from water-pipes; and the statistics of the gas companies also showed that they had considerable leakage. In both cases this could be detected and prevented in subways. It had been alleged more than once that it would be a source of danger to carry the electric lighting companies' wires in the same subway as the gas-mains; but this argument could not be supported by experience, as they had now 5000 yards of electric light wires running in the same subways with gas and water pipes, and no danger had resulted. The inconvenience and permanent injury caused by the breaking up of the newly-made streets, in order to put down the mains of the different companies, was known throughout the whole of the Metropolis; and it was a matter which should certainly be stopped.

Mr. BIDDER: Did I understand you to say there was danger to the community if the pipes were under the control of the companies themselves and not of the Council?

Witness: Where you have as many as eight companies with lines of communication in a channel of that description, if you do not have someone charged with the responsibility of seeing that the rules and regulations for their proper guidance are observed, there will some day be a great public disaster.

As a matter of fact, is it not the case, both in regard to water and gas mains, that when buried in the soil they become practically almost imperishable?—As regards the equalization of the temperature, undoubtedly that is so; but there are some soils through which pipes are laid that are very destructive. Pipes placed in the London clay are very well protected, no doubt.

Will not iron pipes in a subway be exposed to the vicissitudes and fluctuations of temperature, and drought and moisture? and will not the iron require to be treated in the ordinary way by painting occasionally?—Nearly all modern water-pipes are dipped in Angus Smith's preparation, which is quite enough prevention.

Will not that composition peel off if it is exposed to the open air?—I am afraid that applies to paint or anything else. In time it will no doubt wear off. But what I would say is that pipes in a subway are more easily protected than when they are buried in the ground.

Are you aware that the London Water Companies have close upon 3000 miles of pipes; so that, if additional expense is cast upon them in consequence of their removal, it is rather a serious matter?—If the Companies come into new streets which we are about to make, or into a street already made, they having no previous right in that street till it is made, surely they must comply with what is for the public advantage.

But your Bill is not confined to new streets, is it?—I believe so. In the first instance, it deals with existing subways; and in the future it applies to such new ones as may be made in new streets.

In the case of the five original streets named by you in which subways were first laid, substantially the provisions of the Act of 1868 have been put in force, and the pipes are in the subways, are they not?—Yes; but the Water Companies have come in more or less voluntarily in the other cases where the Act does not apply.

What more do you want than to extend the legislation of this Act to subways?—There is, in the first place, a very important point raised by the Electric Lighting Acts, and settled by the Companies' Provisional Orders, that they should pay a reasonable amount of rent for the accommodation afforded.

You are proposing to enact that we should pay rent?—Yes; and the Board of Trade will see that it is a reasonable rent.

After conferring with his clients,

Mr. BIDDER, addressing the Committee, said: I am told I may shorten your proceedings, because one of my clients informs me that terms have been arranged between the Water Companies and the County Council which will render it unnecessary to ask any further questions on their behalf. I believe a clause is being prepared; and if that is so, perhaps it will be better that we should wait until the clause is completed. I have now a few questions to ask for another client—The Gaslight and Coke Company. Of course, what you have conceded to the Water Companies, you cannot possibly, upon any principle, refuse to the Gas Companies.

Mr. PEMBER: I do not know about that.

Mr. BIDDER (to witness): If a water-main burst, and the subway was temporarily filled with water, what would become of the gas-pipes, would they float?

Witness: They might float.

Then the consequence of that would be that that movement of the pipe would probably draw the joints, and make them leaky?—It is quite possible. Under the present arrangement, there are brackets placed at the top and round the pipe, at the expense of the Gas Company, when the pipes are being laid.

I understand that this arrangement to prevent them from floating is necessary now in the subway. Is it necessary in the ground?—No.

So that there at once you come upon an additional expense which you are proposing to impose upon the Company in order that their pipes may lie safely in the subway. Do you propose that the County Council should defray that as part of the cost of removal?—I do not.

Assuming that it is for the public good and advantage that, instead of having as we have now, the statutory right to lay our pipes in the soil of the street, we should be compelled to go into the subway, how can you justify making us pay a rent for having our pipes in that subway?—Because it is cheaper to lay the pipes in the subway, and by that you save leakage; besides, it is altogether more convenient for working.

You think that the various Companies should, among them, pay a rent which is equivalent to the interest upon the cost of the subway?—I think that is a just principle.

Mr. CRIPPS: Supposing there was a leakage of gas in one of the subways, and an electric lighting main was near, and there was also a leakage from the electric lighting main, do you say that there would be no risk of accident?

Witness: There would be no risk until the whole of the air in the subway was charged up to the explosive point.

Have you considered the question of danger at all as regards putting the electric lighting cables and the gas-mains in the same subway?—I have, very repeatedly; and I do not believe there is any danger. I think there is less danger from wires and gas-pipes placed under proper regulations in a subway than there is when they are laid outside.

Wednesday, March 23.

On the re-assembling of the Committee this morning, Mr. *Binnie* gave further evidence, on which he was not cross-examined, as the matter was deemed to be one on which an arrangement could be come to between the Gas Company and the Council. He was then questioned on points bearing upon the Electric Lighting Companies' lines of communication.

Mr. *H. L. Cripps*, Parliamentary Agent of the Council, said he wrote to all the petitioners against the Bill, asking them to meet him and discuss the terms of the measure. The result of the conference had been to practically settle the matter with the telephone companies, the Hydraulic Power Supply Company, the railway companies, and—perhaps more important than any of the others—all the London Water Companies. They had practically settled the terms on which the Bill could be framed, which would be considered reasonable both by the County Council and by the Water Companies. The Gaslight and Coke Company wrote to say they did not intend to discuss the matter. One of the amendments they now had was the definition of the word "subway," which ran as follows: "The expression subway means an arched passage or covered way belonging to the Council, under the surface of a street, which passage or way is adapted for the reception of, or affording convenient access to, the pipes and wires." This amendment had been arranged with Mr. Hollams for the Water Companies. As he had very fairly pointed out, there being no definition in the original draft Bill of the word "subway," it might be that, although there was something under a street which was not adapted for pipes or wires, the effect would have been to limit the Water Companies' powers. The Companies rather suggested that they should draft a separate Bill altogether to deal with their case. But it was thought better to make the present measure one of general application; and so they had met the Companies' views by amalgamating clauses 3 and 4, with, of course, some little alteration. The clause, as amended, would read as follows:—

> The company shall not, in a street where there is a subway, without the consent of the Council, interfere with the surface for the purpose of laying or renewing a pipe other than a communication or supply pipe, unless they shall have given notice to the Council of their intention so to do; and the Council may require the company to lay such pipe in such subway. Where the Council have a subway in any street, it shall be lawful for the Council at any time to require the company, by notice in writing, to place in such subway any pipes which they may thereafter desire to place in the street; and it shall also be lawful for the Council to remove into such subway any then existing pipes or wires of the company in the street for the reception of which such subway shall be convenient.

As regarded removal, he thought the provision they had added to this clause was in the Bill as originally submitted to the Committee and the opponents. This was the provision that had been adopted from the Subways Act of 1868, requiring the Council to pay the cost of the removal, provided that, as respected pipes for the supply of water, no removal should be required to be made in such manner as to interfere, during such removal, with the obligations of the company in regard to the supply of water. The next clause represented the settlement of the basis upon which the charge ought to be made upon those companies who, like the Water Companies, had certain statutory rights of using the streets. What had been proposed in that case was this:—

> It shall be lawful for the County Council to make on the company using any subway a charge for such use and supervision of such subway, and the pipes and wires therein, according to a scale to be determined as hereinafter provided; and until such scale is so determined, the amount of such charge (if not agreed between the Council and the company using such subway) shall be determined by an arbitrator. In the determination of such scale, or of the amount of any such charge, regard shall, as regards water companies, be had only to such saving (if any) as may be effected to the company by reason of the pipe being laid and accessible in a subway, instead of being laid or remaining under a street, or otherwise by reason of the subway, and to the cost of management and supervision of the subway and the pipes and wires therein.

The original proposal had been that, in fixing the charge to be made on the Companies, the arbitrator settling the terms should have regard not only to those matters, but to the cost of construction and maintenance of the subway. He thought Mr. G. Livesey, the Chairman of the South Metropolitan Gas Company, had expressed some apprehension upon the general question which The Gaslight and Coke Company also raised with regard to the juxtaposition of electric lines and gas-pipes; but, speaking generally on the other terms of the Bill, he believed this would meet the views of his Company.

Mr. PEMBER: Then there is the scale of fees and charges to be paid by companies using any such subway?

Witness: Yes; the Companies have assented to that. Continuing, witness said the suggestion of the Water Companies seemed to them to

be rather a good one—that the Act should comprise, in regard to the subways, a code of legislation which might be capable of general application afterwards to the question of any subways to which it might be appropriate; and a clause was inserted to incorporate this suggestion.

Mr. BIDDER: You have made certain provisions for the protection of the Water Companies. Why are they not equally applicable to the Gas Companies?

Witness: I think the Council would probably consider that, if the Bill, amended as we propose to amend it for the Water Companies, would also satisfy the Gas Companies, there is not sufficient distinction to be drawn between the cases of Water and Gas Companies to justify them in objecting to extending those amendments to the latter.

This is a Bill to move the pipes from the road into the subway, in the public interest; and when I am there, I am quite content, if I find I am saved money by being there, to pay the County Council. But why am I to pay a share of the management of the subway, which exists, not for my sake, but for the sake of the public?—You gain rather more than the actual cost in the way of street digging—first of all, by reason of the pipes being more accessible; and you very likely gain a certain amount in reducing leakage.

Mr. BIDDER: The principle is settled I know; and nobody is objecting to it. But I say that, when I have paid the whole pecuniary value of this benefit to me, I have paid for what I get; and you cannot have it twice over.

Mr. *Bassett Hopkins*, a member of the Highways Committee of the County Council, said this Committee had the whole subject of subways referred to them. The present Bill represented the strong views of the Council. With regard to the pipes at present laid in the subways, he had examined the records made under the Metropolitan Board of Works; and there had never been a case of explosion or accident other than of the most trifling character. By being placed in a chamber, the danger to pipes from steam-rollers and things of that kind was very much obviated. The inspection of subways was carried out by a sufficient number of persons to secure constant supervision.

Mr. FREEMAN: You are aware that a clause has been added to the Bill to satisfy the wishes of the Water Companies. Would you be content, and would the Council be content, that this clause should be extended in favour of the other Companies?

Witness: Yes; I think the Council would be content with that. I am fairly satisfied the Highways Committee would not hesitate to recommend such a modification; and I have no doubt the Council would follow their view in the matter.

Mr. LITTLER stated that this was the case for the promoters.

Mr. BIDDER: With regard to the Gas Company's case, we are so nearly settled with it that I almost think if the matter were to stand over, it would probably save trouble. I have no authority to speak for them; but I think you may take it that, if I am satisfied, probably the Commercial Gas Company will not trouble you much more. I think what will satisfy The Gaslight and Coke Company will pretty well satisfy the others.

Mr. LITTLER: I think I may say that the South Metropolitan Gas Company are satisfied; so that it looks as if everybody was getting very much nearer a settlement.

The Committee then adjourned till yesterday.

The Committee on the Birmingham Corporation Water Bill.—Mr. Causton, Mr. Sydney Gedge, Sir W. Houldsworth, Mr. P. Stanhope, and Mr. Powell-Williams have been nominated by the House to serve on the Select Committee on the Birmingham Corporation Water Bill, in association with Mr. Campbell-Bannerman, Mr. Bryce, Mr. Llewellyn, and Mr. Wharton, named by the Committee of Selection. The preliminary meeting of the Committee will take place to-morrow, under the presidency of Mr. Campbell-Bannerman; and the inquiry will be commenced forthwith, in the hope that the Bill may be disposed of before Easter.

The Swinton and Pendlebury Local Board Bill.—The Bill promoted by the Swinton and Pendlebury Local Board to enable them, in pursuance of a clause inserted in the Salford Gas Act of last year, to acquire the portion of the gas undertaking of the Salford Corporation lying within the districts of Swinton, Barton, Eccles, and Little Hulton, came before a Select Committee of the House of Lords on the 18th inst. It was opposed by the Local Boards of Barton, Eccles, Winton, Monton, and Little Hulton, as well as by the Barton Rural Sanitary Authority and the Corporation of Salford. The consideration of the Bill occupied their Lordships till last Tuesday afternoon, when the preamble was passed; but the Committee declined to include the districts of the Eccles and Little Hulton Local Boards and the Barton Rural Sanitary Authority in the scope of the measure. A report of the proceedings will be given next week.

Oldbury Local Board Gas Department.—The annual statement of accounts of the Oldbury Local Board Gas Department for the year ended Dec. 31, 1891, was issued last Saturday by Mr. C. Meiklejohn, the Engineer and Manager. It shows that the total amount borrowed up to that date was £79,199; the loans outstanding amounting to £72,212. During the past year, £217 was expended on new buildings and manufacturing plant, and £60 for new mains, &c. The total expenditure up to Dec. 31 last was £76,147. The manufacture of gas cost £6064, including £4426 for coal, £696 for wages, and £393 for the repairs and maintenance of works. In the distribution of gas, a sum of £260 was expended; and for lighting and repairing public lamps, £257. Rents, rates, and taxes absorbed £524; and the management expenses amounted to £361; the total expenditure being £7478. The gross profit was £3955. The sale of gas realized £8564; the residual products, £2764—the aggregate income being £11,434. After paying interest and instalments for the repayment of the loans, there remained a net profit of £346 on the year's trading. During the twelve months there were sold 3071 tons 19 cwt. of coke, 3 tons 12 cwt. of breeze, 86,564 gallons of tar, and 183,491 gallons of ammoniacal liquor. The quantities of these residuals made in that period were: Coke, 3475 tons; breeze, 218 tons; tar, 80,314 gallons; ammoniacal liquor, 188,971 gallons.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Friday, March 18.

(*Before Lords Justices* LINDLEY, BOWEN, *and* KAY.)

The Staffordshire Gas and Coke Company, Limited, and the Companies' Acts.

This was an appeal by the Liquidator from an order made by Mr. Justice Kekewich on Dec. 8, 1891, as recorded in the JOURNAL at the time, striking the names of Mr. J. F. Rushworth and other persons from the list of contributories of the Company.

Mr. RENSHAW, Q.C., in support of the appeal, said the order was made on a summons taken out by Mr. J. F. Rushworth, of Bradford, and others, to vary the Chief Clerk's certificate as to the contributories. The case was taken in the Court below as a test one, which would bind the others; the facts in all being identical. Mr. Justice Kekewich expunged Mr. Rushworth's name from the list. The point for decision was: Was Mr. Rushworth a member of the Company at the time when it went into liquidation? The order for winding up was made on the 1st of November, 1890. He would give their Lordships a narrative of the Company's history. There was a certain Company called the Mercantile and Domestic Gas Company, which was formed for the purpose of working the patents of one Nicholson; and in that Company Mr. Rushworth held ten shares. On May 16, 1889, an agreement was entered into between the Company of the first part, Francis Nicholson of the second part, and one Joseph Burrows of the third part. This was an agreement by which the Company and Nicholson agreed to sell a certain right to use the patent for the sum of £60,000, payable £500 in shares, and as to £59,500, either in cash or shares "as hereafter provided." The 100 shares were to be treated as founders' shares. There was then an agreement that the name should be altered to the Staffordshire Water Gas Company, Limited; and the Company was incorporated under that name. It was afterwards changed to the Staffordshire Gas and Coke Company by a special resolution. The newly-named Company proceeded to allot ten shares each to Mr. Burrows and the other shareholders in the Mercantile and Domestic Gas Company. They were allotted as fully-paid shares before any agreement had been registered which gave power for this to be done. The Secretary informed Mr. Rushworth by letter that the shares had been allotted, and afterwards sent him the relative certificates. But Mr. Rushworth did not acknowledge the receipt of them, or take any notice whatever, but held them until the liquidation commenced, when the Liquidator sought to make Mr. Rushworth contribute, on the ground that the shares he held were not paid-up shares, although he believed them to be so.

Mr. SWINFEN EADY, who appeared for the respondents, was not called upon.

Lord Justice LINDLEY, in giving judgment, said the Court must decline to interfere with Mr. Justice Kekewich's decision, which would be affirmed, on the ground that Mr. Rushworth never had applied for any shares, and did nothing to acknowledge the shares said to have been allotted him. The fact was, his Lordship said, the shares were issued too soon; they were intended to be issued as fully paid. The Company found out their mistake, and corrected it by cancelling this allotment in October, 1889. Mr. Rushworth, however, was not informed of the cancellation; and the Liquidator contended that he had acquiesced in becoming the holder of only partly-paid shares, and was therefore liable.

The appeal was refused, with costs.

COUNTY OF LONDON ASSESSMENT SESSIONS.

Sessions House, Clerkenwell, E.C.—Wednesday, March 23.

(*Before Sir* P. H. EDLIN, Q.C., *Chairman, and a Bench of Magistrates.*)

The Gaslight and Coke Company's Assessment Appeals.

To-day the decision of the Court was given on the points left unsettled on the previous occasion (*ante*, p. 541.)

The CHAIRMAN: The allocations of rateable value according to the judgments delivered in these appeals are such as to require alteration of several of the present assessments; and the figures I am about to state have been agreed upon between the various parties. I will refer separately to the parishes in the City of London Union. With regard to the parishes in the Strand Union, there will be a reduction of £406 in the rateable valuable in St. Clement's Danes, of £1225 in St. Martin-in-the-Fields, of £298 in St. Mary-le-Strand, of £165 in St. Paul, Covent Garden, and of £18 in the Liberty of the Rolls. In the Precincts of the Savoy, the present assessment is less than the value assigned; and there will therefore be no alteration. In the St. George's Union, the Committee's assessment of the mains in St. Margaret and St. John, Westminster, was £749 less than the proper amount; but in St. George's, Hanover Square, there will be a reduction of £2227. In the Hackney Union, the reduction in the parish of St. John will be £3336, and £417 in Stoke Newington. In St. Mary, Islington, the reduction will be £25,617; in St. Mary Abbotts, Kensington, £1049; in St. Marylebone, £4617; in Paddington, £352; in St. Pancras, £4836; and in St. Leonard's, Shoreditch, £3023. The respective valuation lists will be altered in accordance with these figures. We have now to deal with the costs of these appeals. We are told that the sum total of the expenses incurred in this extensive litigation will be not less than £30,000. It is obvious, therefore, that here are questions of great importance; and a very careful consideration of the facts and circumstances has been necessary for an equitable determination of them. The principles governing the assessment of property of this kind and the distribution and allocation of rateable values in just relative proportions necessitated a valuation of the whole hereditament—that is to say, of the Company's stations, works, mains, and pipes throughout the entire system; and we cannot make a fair apportionment of the costs of this laborious investigation without having

regard to the general result, and the comparative claims and counter-claims of the litigant parties. A sum of £378,000, or (say) three-fifths of the rateable value of the whole, falls to the respondent parishes in these appeals; and the appellants' demands for reduction in these parishes alone would have diminished the value assigned to them by £210,000. After giving credit for the reductions we have awarded in some of them, it is £210,000. There are other arithmetical results of the apportionment to be observed. The total value assigned to these respondent unions and parishes exceeds by £168,000 the rateable values ascribed to them by the appellants in the statements of their demands; but the judgment operates so as to entitle them to reductions amounting altogether to £48,500 in fifteen of the unions and parishes—the calculation as to the remaining eight showing that they were under-assessed therein to the amount of £8000. The Court having no power upon these appeals to raise the values, the latter sums will, of course, stand as they now appear in the respective valuation lists. The position of the City of London Union with regard to the claims for costs is peculiar, and has led to much discussion. There are 114 parishes in this Union; and as to the valuations in five of them, the appellants did not raise any objection. The other parishes were represented by the same Solicitor and the same Counsel, and, with the consent of the appellants, all the assessments in these parishes were dealt with as forming the subject of one appeal; and it was agreed that the subdivision of the total amount assignable to the Union should be adjusted afterwards. The sum total of the rateable values assigned to this Union is £56,696. But the assessments by the respondent Committee amounted to only £51,817; and the appellants required that this sum should be reduced by £34,251—that is to say, that the proper rateable value should be fixed at £15,566. As I have already said, it stands, according to our judgment, at £56,696. Now, it was seemingly upon the aforesaid understanding that, in the tabular statement of the particulars required by the Court—the particulars required for considering the question of costs—the appellants presented only the sums total above mentioned; thus not dealing with the parishes separately, but in union. But as it appeared from the parochial apportionment that they are entitled to a certain reduction in as many as 68 of the parishes, although, upon the whole, they are shown to have been largely under-assessed in the Union, regarding the parishes as constituting one union (it was on Saturday when we came to consider the whole question), the appellants afterwards produced a subdivisional table as the basis of a claim by them to as many distinct orders for costs against those 68 parishes. It will be observed that, for the reasons stated, the appellants avoid the payment of rates on the several amounts in which they are under-assessed in the 41 other parishes; and inasmuch as those under-assessments exceed by nearly £5000 the reductions allowed in the other parishes, which amount to only £10,617, the appellants, while benefiting from these reductions, are exempt from rateability in respect of upwards of £15,000 assigned rateable value in this Union. Upon the actual result we make an order that the appellants pay so much of the general costs of the Assessment Committee as represents the proportion between the rateable value of the parishes in which no reduction will be made, and the total rateable value assigned to the Union; and, save as afterwards appears, we make no order with regard to the general costs relating to the other parishes in this Union. As to each of the parishes included in the Strand Union, excepting the Precincts of the Savoy, we direct that the respondents pay such a proportion of the appellants' general costs as may be determined to be properly chargeable against those parishes respectively. With respect to St. John, Hackney, Stoke Newington, Islington, St. Marylebone, St. Pancras, and Shoreditch, we direct that the respective respondent Committees pay the appellants such a proportion of their general costs as may be determined to be properly chargeable to the Union or parish respectively. In these and in each of the other cases in which the appellants are awarded an order for costs, there will be the set-off against them of the respondents' costs of the first case and the first day's hearing. In the following six appeals, the Company must pay the costs of the respective Assessment Committees: St. Matthew's, Bethnal Green; Bloomsbury; St. Luke's, Chelsea; Hampstead; St. George's, Southwark; and St. James's, Westminster. In St. George's Union, a reduction is ordered in one of the parishes; whereas in the other (St. Margaret and St. John), the valuation was below the proper amount. As to the latter parish, there will be an order to the respondents for their costs in the proper proportion; but as to the former (St. George's, Hanover Square), the Committee will pay such proportion of the appellants' general costs as may be determined to be properly ascribable to this parish, excluding therefrom for this purpose the Company's separate valuation of their works, stations, and indirectly-productive mains situate in this parish. With regard to Kensington, it is to be observed that a reduction of £18,995 was demanded, or £17,946 more than the proper reduction of £1049 resulting from the judgment; and as to Paddington, the value assigned by the Company was less than one-third of the just amount. Here again there are wide divergencies; and, in view of all the circumstances, we shall make no order as to the general costs in either of these appeals. In the latter case—that is, as to Paddington—the appellants must pay the respondents' costs up to and including the first case and the first day's hearing. We make the same order with regard to the Precincts of the Savoy in the Strand Union. We think the costs of the short-hand writer's notes should be equally divided between the appellants and the respondents generally; and that the half falling on the latter should be apportioned according to the relative rateable values. Where no payment has yet been made to the appellants (I am assuming that the costs have been paid by the appellants), or where the payment for copies supplied to any union or parish has already been made in excess of such proportion, the proportion or difference would properly form an item for allowance or set-off in the bill of costs as the case may be; the appellants refunding any surplus excess in the payment already made. If desired, although it is a long list, I will read a statement of the reductions to be made in the City of London Union. [By agreement between learned Counsel, the list was taken as read.] Having regard to cases of this kind, I think I should say this—that as there can be no final order made until the actual figures are ascertained, the several appeals will be respited until this is done; but, if the parties desire it, the lists can be altered to those figures at once.

It was agreed that the costs should be taxed out of Session, and that the Court should have power to deal with any questions arising on the taxation.

The SOLICITOR-GENERAL, on behalf of the parishes, and Mr. CASTLE, for the appellants, thanked his Lordship for the personal courtesy Counsel had received during this long investigation.

NEWCASTLE ASSIZES.—Friday, March 11.

(*Before Mr. Justice* WRIGHT *and a Jury.*)

Mayor and Corporation of Tynemouth v. North Shields Water-Works Company.

This was an action brought against the North Shields Water Company, by the Mayor and Corporation of Tynemouth, for having, as alleged by the plaintiffs, supplied impure water to the borough. It may be remembered that a few weeks ago, as already reported in the JOURNAL (*ante*, p. 446), the Corporation sought, in a Queen's Bench Divisional Court, an injunction to restrain the Company from drawing their water from what were stated to be dangerous sources of supply; but it was refused—the matters in dispute being ordered to go to trial in the usual way. Hence the present proceedings.

Mr. E. TINDAL ATKINSON, Q.C., Mr. STRACHAN, and Mr. T. W. CHITTY appeared for the plaintiffs; Mr. J. LAWSON WALTON, Q.C., and Mr. W. S. ROBSON, Q.C., for the defendants.

Mr. ATKINSON, in opening the case, said the plaintiffs claimed damages and an injunction, and also a *mandamus*, in reference to the character of the water supply of the borough. Their allegation was that for a long time past the water sent out by the defendants had been entirely unfit for drinking or for other domestic purposes. The Company were incorporated under an Act of 1786, empowering certain persons to enter upon land belonging to the Duke of Northumberland, and search for springs of water, and to convey water from such springs and streams to the district which they were authorized to supply; the water being described as fresh water, and provision being made for the price at which the water should be sold. In 1857 the district was placed under a Local Board; and in 1866 the Tynemouth Improvement Act was passed. In that Act were a number of provisions with regard to the supply of water; the Company being bound to provide water for domestic purposes. Since 1786 the Company had had a monopoly of the supply of water within the district of the Tynemouth Corporation; and for many years it had been bad in quantity and quality, and complaints had been made extending from 1883 down to the present time, consistently and frequently, to the Company. In 1883, the defendants, having made arrangements with the Newcastle and Gateshead Water Company for a supply of water from Newcastle, proceeded to intercept some water which was pumped from the Shiremoor Colliery. At that time the colliery was being partially worked; and a large quantity of water, amounting to about 600,000 gallons per day, was pumped out. The supply of the Company not being sufficient for the requirements of the district which they were bound to serve, they proceeded to erect a dam in the course of the water, so as to intercept it, and sent it down pipes which they constructed; carrying the water to their reservoirs, where it was mixed with the rest, and sent to the consumers. The water was utterly unfit for domestic purposes. When the pit was working, it was bound to be contaminated by human sewage and the excrement of horses; and it was of a distinctly yellow colour, owing to the presence of peroxide of iron. In addition to this, there was in it a large quantity of alkaline sulphates, including sulphate of magnesia. The total daily supply of water to the borough was 700,000 gallons. Of this quantity 440,000 gallons came from the Newcastle supply, 120,000 gallons from the Whitley reservoir, and 120,000 gallons from the Shiremoor pit. The Company thought so little of the Shiremoor water that they used it only when the rest was not sufficient for the purposes of the borough. There were three sets of reservoirs; and the water was contaminated by the Shiremoor water, of which since November last they had abandoned the use. It would also be contended that the water was contaminated by the sewage of the fields through which it passed.

The following evidence was then given:—

Mr. *D. Balfour*, C.E., said he had inspected the course of the water-way from the Shiremoor Colliery to the dam, and also the three Ridges reservoirs. The distance from the Shiremoor pumping-station to the reservoirs was 2⅜ miles. The water as delivered from the pump at Shiremoor was of a light reddish opaque colour. It ran through fields; part of its course being through a valley, the fields on either side of which had manure upon them.

Mr. WALTON said this was the first time it had been suggested that there was any contamination except that from the colliery.

Justice WRIGHT: Nor is there anything more likely to be fatal to the plaintiffs' case, if the contamination is as suggested. What the plaintiffs had to do was to show the quality of the water when it was pumped from the colliery, and its quality when it left the reservoirs.

Dr. *J. E. Gofton*, Medical Officer of Health for Tynemouth, said that since 1883 he had given special attention to the water supply of Tynemouth, and had made reports thereon to the Corporation. He had taken samples of the water, and had given them to the Sanitary Inspector to be conveyed to Mr. Pattinson, the Analyst. Mr. Pattinson made his reports of the analyses. Mr. Pattinson considered the samples unsuitable for domestic purposes; and witness said his opinion was that the water was quite unfit for a town supply.

In answer to an observation by Mr. Walton,

Justice WRIGHT said he should tell the jury that water pumped from a colliery was not, to his mind, capable of being considered by them either as a stream or a spring; and if the Company obtained water from the Red Burn, which at the best of times was half fed, and sometimes much more than half, by water from the colliery, he should say this was exceeding substantially their parliamentary powers.

Mr. WALTON said the Company had most of their water from Newcastle; and the Newcastle Company procured theirs from every conceivable source.

Justice WRIGHT said the rule was that, unless there was harm done, no injunction would be granted. But if there was any case of the water being impure, that would be enough to support an injunction. Supposing that, when the power was given, the Corporation came forward as opponents, he could not think that the Company would have been allowed to pump this water into their reservoirs if the analyses had been known. Unless there was some objection to the quality of the water, he could not interfere.

Mr. *A. Wynter Blyth*, Medical Officer of Health for Marylebone, said he agreed substantially with Mr. Pattinson's analyses.

Mr. *H. Clark*, Secretary to the Company, said he remembered a well disappearing some years ago; it was near to the Shiremoor Colliery, and it ceased owing to the pumping operations of the Shiremoor Colliery Company. It was arranged with that Company that they should allow water to flow into an old culvert, and in that way reach the Red Burn—an old stream—and the culvert was partly an artificial culvert.

Mr. *Addison Potter* said he was Engineer of the Shiremoor Colliery, from its commencement, in 1871, up to September, 1891. The pumping shaft was sunk to take the water out of the High Main seam, which had been there for 100 years, so that the water would not percolate into the Bensham seam. The quantity pumped was 500 gallons per minute; and the depth from which it was drawn was 44 fathoms.

Mr. *A. L. Forster* said he was formerly Engineer of the defendant Company, having been appointed in March, 1883. At that time, pumping had commenced at the colliery. The Company made an arrangement by which they gave the colliery Newcastle water in consideration of the colliery keeping their boiler water out of the Water Company's shaft. The latter Company were then pumping water from the Red Burn. He was not with the Company when the well supply ceased; but he surmised that the quantity of water lost to the Ridges reservoirs, independently of the Whitley reservoir, was about 130,000 or 140,000 gallons per day when the well ceased giving out water. They took the water for the purpose of making up the supply, and not permanently.

Justice WRIGHT repeated that he should so construe the Act of 1786 as to hold that the water in question was neither a stream nor a spring within the meaning of the section.

Mr. WALTON said in that case he should have to ask his Lordship to suspend the operation of any injunction.

Mr. ATKINSON asked that the defendants should give an undertaking not to use the water until the appeal was heard. They were not using it at the present time, nor had they been doing so since November. The appeal would be heard long before the necessity arose to tap the source of supply in question.

Mr. WALTON gave an undertaking that the water should not be used except in case of necessity, pending the appeal.

His LORDSHIP then formally decided that the water was not properly capable of being regarded as a spring or a stream, and was not, therefore, within the power of the Company; also that there were sufficient objections in substance to the supply to justify interference by injunction.

By direction, the jury gave a verdict for the plaintiffs for 1s. beyond the 40s. paid into Court.

Bangor (Co. Down) Water and Gas Supply.—The Bangor (Co. Down) Town Commissioners have received the sanction of the Local Government Board for Ireland to a loan of £1300 for water, gas, and sewerage extensions.

New Water-Works for Bude and Stratton.—An inquiry was held last Wednesday, at Bude, by Mr. S. J. Smith, C.E., one of the Inspectors of the Local Government Board, into an application by the Stratton Sanitary Authority, to borrow £3600 for the purpose of constructing water-works for Bude and Stratton. The scheme was explained by Mr. Anson, C.E., who stated that it was proposed to take the water from the reservoir of the Bude Canal Company, which was about eight miles from Bude, and contained nearly 80 acres of water. There was no opposition.

Sheppy Gas Company.—The annual general meeting of this Company was held at Sheerness on the 16th inst.—Mr. C. B. Shrubsole in the chair. The Secretary (Mr. A. W. Marks) read the Directors' report, which was noticed in the JOURNAL for the 15th inst.; and the accounts were taken as read. In moving the adoption of the report, the Chairman called attention to the exceptional increase in the consumption of gas which had taken place in the past twelve months. He stated that 30 years since the quantity of gas consumed in one year, including the Dockyard and Garrison, was 10 million cubic feet; while the quantity of gas sent out last year was 46 millions. In 1861 the price of gas was 5s. per 1000 cubic feet (it having just previously been 7s. 6d.); now it was only 3s. 3d. Some time ago the consumption experienced a temporary check, caused by some consumers using oil. But this only affected them for one year; and he was glad to say that nearly all had now reverted to gas. The loss through leakage had gone up from 78 feet per 1000 in 1890 to 100 feet per 1000 in 1891. This represented upwards of a million cubic feet of gas, or at least 100 tons of coal, besides labour—a loss of about £80 to the Company. He hoped that the time was not far distant when the Local Board would use a light steam-roller on the roads. Having alluded with satisfaction to the fact that the financial position of the Company justified the Directors in recommending the payment of full dividends, the Chairman intimated that it would be necessary to make a call on the "C" shares to meet the expenses of necessary extensions. Mr. Blackman seconded the motion, and it was carried. The dividends recommended having been declared, and the retiring Directors and Auditor re-elected, a vote of thanks was accorded to Mr. Marks and to the Manager (Mr. W. T. Carpenter) for their excellent management of the buisness of their respective departments. In the course of Mr. Carpenter's reply, he stated that the works were quite equal to producing double the quantity of gas now sent out. A vote of thanks was then accorded to the Chairman and Directors, and the proceedings closed.

MISCELLANEOUS NEWS.

COMMERCIAL GAS COMPANY.

The following is the report of the Directors of this Company, which, with the accounts for the half year ending Dec. 31 last, will be presented at the ordinary general meeting of the proprietors to be held on Friday next:—

The Directors submit the accounts for the half year ended Dec. 31, 1891. The revenue account shows a net profit for the half year of £27,666 5s., making, with £742 3s. 8d. received for interest, £28,408 8s. 8d. This, added to the amount brought forward from previous half years, makes £65,239 0s. 9d. Deducting therefrom £2925 for interest on debenture stock, there remains standing to the credit of the net revenue account a balance of £62,314 0s. 9d., of which, having regard to the sliding scale and the price of gas charged during the half year, £48,266 is available for dividend. The Directors recommend the payment of dividends at the rates of £13 per cent. per annum upon the old stock of the Company, and of £10 per cent. per annum upon the new stock, both less income-tax. The balance of the net revenue—£18,494 4s. 9d.—will be carried forward to the next half year. To meet the requirements of the Company, further capital is necessary; and the Directors have resolved to issue the £35,000 debenture stock authorized to be raised by resolution passed at the ordinary general meeting in April, 1891. Letters of allotment will be addressed to the proprietors in May; and the amounts payable on accepted allotments will be due on the 20th of June. The Directors have resolved to increase the price of gas to private consumers from 2s. 4d. to 2s. 6d. per 1000 cubic feet after the taking of the Lady-day indices. The following Directors—Sir J. C. R. Colomb, M.P., and Mr. J. G. Pilcher—retire by rotation, and, being eligible, offer themselves for re-election. Mr. G. Ilsley, one of the Auditors, will also go out of office by rotation, and, being eligible, offers himself for re-election.

The accounts accompanying the report consist of the usual statements. The statement of capital stock (No. 1) shows that £715,000 has been paid up, out of a total of £830,000 authorized. The statement of loan capital (No. 2) stands as at the close of the previous six months—£130,000 raised out of £300,000 authorized. The capital account (No. 3) shows a total expenditure of £845,243, of which £11,591 was spent during the past six months. The latter figure is reduced to £8089 by the premium of £3502 realized by the sale of stock. The receipts on capital account at the close of the year amounting, as shown above, to only £845,000, there was a debit balance of £243. The other statements in the accounts are reproduced in full on the opposite page.

[ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The half-yearly meeting of this Company will be held on Thursday, when the Directors will submit a report which shows that the gross receipts resulting from the six months' working amount to £139,699, and the expenditure to £100,555; leaving £39,144 to be carried to the credit of the profit and loss account. After the payment of £5070 interest on debenture stock, there is a net profit of £34,167, which includes £92 interest derived from other accounts. This sum, with £24 brought forward from the previous accounts, leaves a gross sum available for dividend of £34,191. The Directors recommend the payment of dividends at the rate of 10½ and 7½ per cent. per annum on the respective shares, the payment of which will absorb £33,857, leaving a balance of £334 to be carried to the next accounts. There has been added to the reserve fund invested a sum of £1146 (being the half-year's interest thereon); making the amount standing to the credit of that fund, £61,670. The Directors further report that the additional facilities offered to users of gas-engines under the hire-purchase system, as well as a rebate on the cost price of the engines, have resulted in a large number being put into operation; and they expect, when these liberal allowances are better understood, that gas-engines will be still more extensively used. There has been a considerable increase in the sale of gas cooking-stoves and appliances for heating by gas. The new ball-fuel fires, with patent cowl to prevent down-draughts, they say are a great success. The Directors have decided on opening an exhibition of gas apparatus early next month. The great success which attended the cooking lessons given last year has induced them to employ a lady, who holds a diploma from the South Kensington School of Cookery, to give a three months' course of lectures. With regard to the manufacturing results, the statements referring thereto show that 54,101 tons of coal and 9701 tons of cannel were carbonized. From this there were produced 646,532,000 cubic feet of gas (599,372,000 feet being accounted for); 77,501 chaldrons of coke; 4305 chaldrons of breeze; 679,679 gallons of tar; and 1,302,250 gallons of ammoniacal liquor.

OTTOMAN GAS COMPANY, LIMITED.

The Ordinary Meeting of this Company was held last Tuesday, at the London Offices, 9, Queen Street Place, E.C.—Mr. EDWARD HORNER in the chair.

Mr. T. GUYATT, in the absence of the Secretary (Mr. A. J. King), read the notice convening the meeting; and it was agreed to take as read the report and accounts, which were referred to in last week's issue (p. 544).

The CHAIRMAN said, before moving the adoption of the report and accounts, he should like to make a few remarks upon them. He hoped the shareholders would consider, with the Directors, that the net result of the half-year's operations had been most satisfactory. Taking the revenue account first, the quantity of coal carbonized had been 177 tons more than in the corresponding period of 1890; but the cost had been about £58 less. The salaries and office expenses at Smyrna were higher, arising from an exceptional item of £231. Exchange had also

ACCOUNTS OF THE COMMERCIAL GAS COMPANY FOR THE HALF YEAR ENDING DEC. 31, 1891.

No. 4.—REVENUE ACCOUNT.

To Manufacture of gas—				By Sale of gas—			
Coals, including dues, carriage, unloading, and trimming (see account No. 8)	£84,997 19 9			Common gas, per meter, at 2s. 4d. per 1000 cubic feet	£115,696 7 10		
Salaries of Engineers, Superintendents, and other Officers at works	2,082 0 0			Public lighting and under contracts, common gas. (See statement No. 10.)	9,310 11 1	£124,946 18 11	
Wages (carbonizing)	20,160 10 0			Meter-rental	£1,933 3 5		
Purification, including £1876 9s. 8d. for labour	4,139 13 1			Stove-rental	713 16 10		
Repairs and maintenance of plant and works, materials and labour (less £211 received for old materials)	13,752 13 6					2,647 0 3	
		£125,132 16 4		Residual products—			
Distribution of gas—				Coke, less £3759 4s. 3d. for labour	£26 323 15 1		
Salaries and wages of Officers (including Rental Clerks)	£2,317 19 9			Tar	10,084 7 8		
Repairs, maintenance, and renewal of mains, service-pipes, and fittings, including labour	2,072 12 10			Ammoniacal liquor and sulphate	9,636 9 5		
Repairs and renewals of meters and stoves	2,133 14 8				£46,053 12 2		
		6,524 6 10		Less loss on breeze, after deducting £575 7s. 3d. for wages	155 2 1		
Public lamps—						45,898 10 1	
Lighting and repairing		2,326 1 5		Miscellaneous receipts—			
Rent, rates, and taxes		5,674 7 11		Rents	£149 12 3		
Management—				Transfer fees	26 0 0		
Directors' allowance	£1,250 0 0					175 12 3	
Company's Auditors	75 0 0						
Salaries of Secretary, Accountant, and Clerks	1,089 8 0						
Collectors' salaries and commission	1,470 5 0						
Stationery and printing	412 1 5						
General charges	423 17 6						
		4,720 11 11					
Bad debts		794 14 0					
Law charges		99 10 7					
Superannuations		658 16 0					
Official Officers		70 11 6					
		£146,001 16 6					
Balance carried to profit and loss, net revenue account (No. 5)		27,636 5 0					
		£173,668 1 6				£173,668 1 6	

No. 5.—PROFIT AND LOSS (NET REVENUE ACCOUNT).

Interest on debenture stock	£2,925 0 0	Balance, June 30, 1891	£81,634 12 1
Balance available for dividend, carried to balance-sheet	62,314 0 9	Less amount of dividend paid for half year ending June 30, 1891; and £4 forfeiture for defective illuminating power	44,804 0 0
			£36,830 12 1
		Balance from revenue account (No. 4)	27,666 5 0
		Dividends and interest balance	742 3 8
	£65,239 0 9		£65,239 0 9

No. 6.—RESERVE FUND.

Balance on Dec. 31, 1891	£44,379 5 1	Balance on June 30, 1891	£44,379 5 1
	£44,379 5 1		£44,379 5 1

No. 7.—INSURANCE FUND.

Coals lost by the wreck of the s.s. "Wapping"	£372 12 5	Balance on June 30, 1891	£34,000 0 0
Balance on June 30, 1891	33,627 7 7		
	£34,000 0 0		£34,000 0 0

No. 8.—STATEMENT OF COALS.

Description of Coal.	In Store, June 30, 1891.	Received during the Half Year.	Carbonized during the Half Year.	In Store, Dec. 31, 1891.
	Tons.	Tons.	Tons.	Tons.
Common	19,451	119,222	111,255	27,418
Cannel	1,163	5,016	3,877	2,302
	20,614	124,238	115,132	29,720

No. 9.—STATEMENT OF RESIDUAL PRODUCTS.

	In Store, June 30, 1891.	Made during the Half Year.	Used during the Half Year.	Sold during the Half Year.	In Store, Dec. 31, 1891.
Coke—chaldrons of 36 bushels*	27,328	150,924	39,196	107,545	31,511
Breeze do. do.	3,666	16,185	4,000	11,745	4,106
Tar—gallons	271,600	1,158,935	—	1,051,135	371,400
Ammon. liq.—butts of 108 gals.	8,070	37,883	32,018	—	19,935
Sulphate of ammonia—tons	321	1,070	—	700	691

* Under "Weights and Measures Act, 1878."

No. 10.—STATEMENT OF GAS MADE, SOLD, ETC.

Description of Gas.	Quantity Made. Meter Register.	Quantity Sold. Public Lights and under Contracts (estimated).	Quantity Sold. Private Lights (per Meter).	Quantity Sold. Total Quantity Sold.	Quantity used on Works, &c.	Total Quantity accounted for.	Quantity not accounted for.	Number of Public Lights.
	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	
Common	1,140,256	58,754	991,169	1,049,923	14,253	1,064,176	76,080	5,313

BALANCE-SHEET.

To Net Revenue—				By Capital—For balance, per account No. 3			
For balance, per account No. 5	£62,314 0 9					£243 0 8	
Reserve Fund—				Cash at Bankers		3,846 16 11	
For balance, per account No. 6	44,379 5 1			Cash in hand for current expenditure		2,600 0 0	
Insurance Fund—				Amount invested in Consols		78,379 5 1	
For balance, per account No. 7	33,627 7 7			Stores in hand—			
Unclaimed dividends	1,926 6 8			Coals	£22,561 0 0		
Deposits	9,356 6 7			Coke	7,877 13 4		
Interest on debenture stock	164 8 2			Ammoniacal liquor and tar	13,895 0 0		
Sundry tradesmen and others, for amount due for coals, stores, and sundries	22,558 11 7			Sundries	5,986 17 2		
						50,320 10 6	
Loan from Bankers	48,000 0 0			Accounts due to the Company—			
				Gas-rental, quarter ending Dec. 31, 1891	£75,597 19 8		
				Arrears outstanding	424 16 0		
						76,022 15 8	
				For coke and other residual products	£10,655 0 3		
				Sundries	258 17 4		
						10,913 17 7	
	£222,326 6 5					£222,326 6 5	

increased; but this was owing to the remittances having been larger. The item of depreciation, renewals, and repairs, had increased by the charge for the first time of £374 written off investment; being at the rate of 1 per cent. per annum. Bad debts had advanced by the writing off of some old accounts for fittings. The other items on the debit side of the account did not call for special remark. But on the credit side, it would be noticed that there was the gratifying increase in the gas receipts of £452; in products, of £97; and in fittings, meter-rental, &c., of £518—in all £1068. The make of gas had been good; and the unaccounted-for gas was the same as in the December half of 1890. In consequence of this satisfactory state of affairs, the Directors were able to recommend the shareholders to transfer £1000 to the reserve fund, to accept a dividend at the rate of 7 per cent. per annum, and to carry forward £375. The expenditure on capital account had been £1671, for completing 100 new public lamps, and for the laying of a new 10-inch main in Smyrna, from which both the Company and the inhabitants would derive benefit. The Chairman concluded by moving—"That the report and accounts now presented be received and adopted."

Mr. A. J. DOVE seconded the motion.

Mr. BEARD remarked that he considered the report was a very satisfactory one. He had been a shareholder since the concern was first established; and he remembered the time when they were only getting 2 or 3 per cent. Regarding the question of coal, he asked whether the increased price would affect the Company in the future.

The CHAIRMAN replied that it would not very materially.

The motion was then carried unanimously.

On the proposition of the CHAIRMAN, seconded by Mr. DOVE, resolutions were passed carrying £1000 to the reserve fund (making it £3000), and declaring a dividend, on both classes of shares, at the rate of 7 per cent. per annum.

The retiring Directors (Mr. E. Horner and Mr. J. Orwell Phillips)

were re-elected on the motion of Mr. DOVE, seconded by Mr. CHARLES GANDON; and the Auditors (Mr. C. K. Butt and Mr. T. Guyatt) were re-appointed on the proposition of Mr. W. H. HARDY, seconded by Mr. BEARD.

The CHAIRMAN then moved, and Mr. STEPHENSON R. CLARKE seconded, a vote of thanks to the Consulting Engineer (Mr. H. W. Andrews), the Engineer (Mr. John Gandon), and the staff for their efficient services.

This was passed; and a similar compliment was paid to the Chairman and Directors, on the motion of Mr. R. L. ANDREWS, seconded by Mr. R. LAIDLAW.

The proceedings then terminated.

COLONIAL GAS UNDERTAKINGS.

Having practically closed our account of the progress of the various provincial gas companies during the latter half of last year, attention may now be directed to a few colonial gas undertakings, reports respecting which have lately come to hand.

The working of the Australian Gaslight Company in the half year ending Dec. 31 last resulted in a net profit of £52,844. Adding to this the balance brought forward—£2527—there was a sum of £55,371 available for distribution. Out of this the Directors recommended the payment of a dividend for the six months of 9s. per share on those fully paid, and 6s. per share on the new ones. This would absorb £49,635, and leave £5736 to be carried over. The Company are about to undertake the supply of electric light; and they have accordingly promoted a Bill to obtain the necessary statutory authority. The measure has already passed the Upper House; and at the time of our last advices, it was before the Assembly. With regard to the Company's plant and works, which are under the supervision of their Engineer (Mr. T. J. Bush), they are reported to be in good order. As the accounts accompanying the report consist merely of the profit and loss account and the general balance-sheet, only a few particulars can be furnished as to the working. The sale of gas produced £198,095; and the manufacturing expenses were £125,731. The total expenditure (including £669 placed to the cooker suspense account) was £145,252.

The Brisbane Gas Company had not a very satisfactory half-year's working, for, notwithstanding extensions of mains in the suburbs, there was an actual decrease in the quantity of gas sold, as compared with the six months ending Dec. 31, 1890, owing to continued general depression. The sale of gas produced £19,875; its manufacture costing £7974. After paying all expenses and writing £1111 off plant, there was left a balance of £13,296. A dividend of 6 per cent. was recommended.

The South Brisbane Gas Company made a profit of £1929 on the working in the latter half of last year. This, added to the balance brought forward—£952—made a sum of £2881 available for distribution. The Directors disposed of it as follows: In further liquidation of debenture expenses, £100; special appropriation for the renewal of retorts, £100; dividend at the rate of 7 per cent., £1613; dividend-tax, £80—leaving £986 to be carried forward. The sale of gas and residuals realized £6246; and the expenses of manufacture came to £3400. As mentioned in the JOURNAL last week, the Directors have lost their Engineer and Manager, Mr. J. Davies, by death; and the appointment has been conferred upon his son, Mr. G. A. Davies.

The Directors of the Maryborough (Queensland) Gas Company, in their half-yearly report, express regret that, notwithstanding great reductions made in the working expenses during the past year, the profits realized are below anticipations, owing, as in the case of Brisbane, to the continued depression in trade. The profit for the six months ending Dec. 31 last, with the balance brought forward, was £1196, from which £50 had to be deducted for the dividend tax; leaving £1146 available for distribution. Of this, £1000 was employed in the payment of an 8 per cent. dividend; and the remainder was carried forward. The Engineer and Manager (Mr. J. Henderson, C.E.), in his report to the Directors, expressed regret at the depression in the town causing a reduction in the consumption of gas by existing customers. There were, however, a good many new services put on, although their effect was not felt. The works are in excellent order; but the rebuilding of two beds of retorts is to be undertaken.

During the half year ending Dec. 31, last, the business of the Launceston (Tasmania) Gas Company increased to the extent of 12 per cent., as compared with the corresponding period of 1890. The Company secured the contract for supplying gas to the Tasmanian Exhibition; and the lighting of the buildings has been admitted to be excellent, while the cost has been below the estimate given. The number of consumers is steadily increasing; and the use of gas for cooking and heating purposes is growing in public favour. The net price of gas is to be further reduced 5d. per 1000 cubic feet (to 6s. 8d.) as from the 1st prox.—a concession to the consumers which will amount to £1000 a year. The Directors confidently hope this will soon be compensated for by a more extended use of gas. The total receipts in the six months under review were £11,521; the expenses, £6785—of which £2685 was for salaries and wages, and £3232 for coals. The amount carried to the profit and loss account was £4736; the balance of which account at the close of the year was £4312. A dividend at the rate of 12 per cent. per annum has been declared. The coal carbonized was 3008 tons; the quantity of gas produced being 30,125,800 cubic feet, or 10,014 cubic feet per ton. The illuminating power, as tested by a Sugg No. 1 Argand burner, was 18·93 candles. The gas unaccounted for, taking the entire year, was 3·05 per cent. The increased make of gas last year, as compared with 1890, was 7·88 per cent.; and the actual make for the year was slightly more than double that of 1883. These figures show the healthiness of the concern, the working management of which is under the supervision of Mr. T. S. Cleminshaw, the Company's Engineer.

The last accounts to hand of the Rockhampton (Queensland) Gas and Coke Company, Limited, cover a period of seven months ending Dec. 31 last. In the report accompanying them, the Directors express their pleasure at being able to state that the business of the Company is in a prosperous condition. Although the liberal reduction granted in the price of gas made a difference of fully £200 in the revenue, the profit for the above-named period was £1766, which was brought up, by the addition of the balance carried forward, to £1851. The latter was the amount standing to the credit of the profit and loss account at the close of the year; and from it the Directors recommended the declaration of a dividend of 10 per cent. per annum—leaving £16 to the good. The Company have taken a definite step in the matter of electric lighting. The Directors instructed their London agents to invite applications for the position of Electrical Engineer to the Company; and Mr. A. E. Neal, formerly of Birmingham, was selected. He has reported on the systems most suitable for Rockhampton; and the Directors have decided to proceed without delay, believing that the early introduction of the electric light will be advantageous. A suitable site has been secured for the works, and upon the frontage general offices and show-rooms will be erected for carrying on both sections of the Company's business. The gas-mains have been extended to North Rockhampton—a step which promises to yield a good return on the capital invested. The reduction in the price of gas used for other than lighting purposes has had the effect of creating a large demand for gas-stoves; and there is little doubt that the increased consumption of gas for culinary operations will amply repay the Company for the concession they have made to their customers. The receipts arising from the sale of gas amounted to £5291; the coal costing £1318, and the manufacturing expenses being £704.

The Directors of the Wellington (New Zealand) Gas Company report a substantial increase in the consumption of gas during the past year; and consequently the working shows a decided improvement. The Directors, therefore, in view of these favourable circumstances, decided to abolish meter-rents and reduce the price of gas as from the commencement of the year (making it 8s. 4d. gross and 7s. 1d. net per 1000 cubic feet). They hoped that by so doing the use of gas, especially for cooking and heating purposes, would be stimulated. The receipts for gas amounted to £27,906; the cost of coal, wages, &c., less coal in stock, came to £12,829. The balance to the credit of the profit and loss account was £7050; and a dividend of 6 per cent. has been paid—making 12 per cent. for the year. The whole of the plant, which is under the supervision of Mr. H. P. Higginson, M. Inst. C. E., has been maintained in good condition.

THE DURHAM MINERS' STRIKE AND THE SUPPLY OF GAS COAL TO LONDON.

In view of the strike of miners in Durham, a good deal of public interest has been manifested in the gas supply of London; and some doubts have arisen in the minds of nervous people as to the Companies being able to ensure their supplies of raw material. A notice posted up at the London Coal Exchange last Tuesday, stating that among the cargoes arriving or due were "two steamers with German coal for the South Metropolitan Gas Company," indicated that at all events one Company was turning its attention to "fresh fields." According to one of the London evening papers, the members of the Exchange were pleased with this challenge to the Unions, who, it was stated, would bring up all their forces to prevent the coal from being unloaded. The announcement of what the Company had done caused some excitement; and the Chief Engineer (Mr. Frank Livesey) was "interviewed" on the matter. He stated that his Company, in common with all others, preferred Durham coal; but the strike in the Tyne district had forced them to look about for other sources of supply. Some time ago, promises of assistance in case of difficulty were received from various foreign gas companies; and he had been recommended to try some of the Westphalian coal, which was highly esteemed in Germany for its gas-making properties. So far, the exportation was only an experiment; and he did not think it would be at all necessary to buy largely from abroad. The best Yorkshire coal made even better gas than that from Durham; but as it was sent by rail to Hull, and then shipped, it was more expensive. As to the effects of the strike and stoppage, Mr. Livesey said that if the Durham men remained out for two or three months, and all the London Gas Companies went to Yorkshire for their supply, prices would necessarily rise; but he did not think the cost of gas would be increased to the consumers. Notwithstanding all the efforts of the miners, there could be no doubt that the price of coal was declining. The Gas Companies had offers of coal at a lower figure than the present contract prices. The action of the Coal Porters' Union in promising the Federation Board that they would not unload any coal coming from abroad did not affect his Company in any way, as the cargoes would be brought alongside their own depôts and unloaded by their own men.

In addition to the importation of foreign coal, large quantities have been obtained from the Fifeshire mines. Two ships laden with Scotch coal reached the Regent's Canal Dock during the week; the bulk, if not the whole, of the cargo being destined for the Commercial Gas-Works. Referring to this matter last Friday, the *Evening Standard* confirmed the statement made above that the Durham coal-owners are resolved to fight on to the bitter end. At the same time, there is not much fear that the Gas Companies will hold their ground now and prospectively. Apart from the Yorkshire fields alluded to by Mr. Livesey in his interview, there are the Midlands, the coals from which district might be utilized for gas-making purposes.

The "Electric Fires" in Liverpool.—It will be remembered that a short time since fires occurred in several of the boxes containing the electric wires underneath the paving of certain streets in Liverpool. Major Cardew was recently sent down by the Board of Trade to make an examination; and a copy of his report to the Board on the subject was submitted to the Watch Committee of the Corporation yesterday week. This provoked a great deal of discussion. Ultimately the City Engineer was instructed to make an inspection of the street boxes, and present a report to the Committee.

THE STOKE-UPON-TRENT GAS UNDERTAKING.

The Finances of the Gas Department.

A Special Meeting of the Stoke-upon-Trent Town Council was held last Thursday—the MAYOR (Alderman W. Kirkham) in the chair—for the purpose of considering the report of Messrs. Alfred Lass, Wood, and Co., upon the accounts of the Gas Department for the year ended March 31, 1891, a full abstract of which was given in the JOURNAL last week.

Alderman LEASON, Chairman of the Gas Committee, explained that in October last, while the Council were considering the desirability of promoting a Bill in Parliament to empower them to erect new gas-works, he stated that the Committee could deliver at the consumer's meter at a cost of 1s. 10d. per 1000 cubic feet, as compared with 3½d. per unit for electricity—13 units being required to produce lighting power equal to 1000 cubic feet of gas. This statement was disputed, as well as his contention that the Corporation were making a profit out of the gas supplied to the North Staffordshire Railway Company. In consequence of this difference of opinion, it was decided to have the assistance of an independent Accountant to report upon the two points. Mr. Lass was accordingly called in; and he contended that this gentleman's report fully maintained, if it did not more than maintain, the position of the Committee. In his report, Mr. Lass referred to two subsidiary questions, which, however, were of considerable importance. They were of such a nature that, in his opinion, they ought to have been considered in Committee, and a report thereon submitted to the Council. Other members, however, held a different opinion; and therefore the questions would have to be discussed with the other points contained in the report. The first of these subsidiary matters was that of the sinking fund; and no doubt it was a surprise to the Council to be told that there was a deficiency of £800. At the time the gas-works were purchased by the Corporation, some difficulty was experienced in raising the amount of the purchase-money. They could not obtain this in a lump sum, and for the period allowed by the Act, but were compelled to raise it in several amounts, at different prices, and for various periods. Their Act gave them four years before making preparation for a sinking fund; and acting upon the suggestion of the late Alderman Turner, the Committee decided, instead of paying annual instalments upon the whole of their loans, to take the largest loan and pay it off by such annual instalments as would be equivalent to paying instalments upon the whole of their liabilities. The Local Government Board pointed out that this was not in accordance with the provisions of the Act. But the late Alderman Keary advised them that they were perfectly right in the course they were pursuing; and a deputation from the Council waited upon the Local Government Board to discuss the matter with them. The Board agreed that their mode of repaying their loans was an advantage to the borough; but they maintained that it was against the spirit of the Act, and that it would be necessary for them to obtain a Provisional Order to legalize the principle upon which they were acting. The Order was obtained; and the Committee were under the impression that they had made a good bargain. But, unfortunately, the figures upon which they were acting, and which they submitted to the Board, were not incorporated in that Order. This led Mr. Lass to suggest means of making up a supposed deficiency in the sinking fund; and it was for the Council to decide what action should be taken if a mistake had been made. [Mr. SANT: There has been no mistake.] Another question raised by Mr. Lass was that of the reserve fund, which he said only amounted to £2775, instead of £5000, as provided by the Act. It was the opinion of the Committee that future generations should bear their share of the burdens of the gas undertaking, and that therefore there was no necessity for filling up the reserve fund hurriedly. They were forming the fund slowly, but surely; and in course of time, they would reach the limit of £5000 specified in the Act. Mr. Lass suggested that there was a question whether the reserve fund was invested according to law. The Committee had lent the money to the Corporation upon security of the sewage farm; and they were advised that this was a legal investment.

Mr. GEEN pointed out that Mr. Lass, in his report, put down the cost of gas at the consumer's door at 19·02d.; but in his working statement, he showed that, when all the items "chargeable" were taken into account, it amounted to 28·86d. With regard to the supply of gas to the Railway Company, he was also supported by Messrs. Wade, Guthrie, and Co. in his contention that such a sum for interest and depreciation should be included in the cost as would be required to renew all apparatus and fittings used in the manufacture of the gas, and that therefore the charge of 2s. 3d. per 1000 cubic feet to the Company resulted in an annual loss of £33 12s. 9d., instead of a profit of £265, as shown in Mr. Lass's report. Further than this, he submitted that, as the net profit from the gas undertaking last year was £2475, or equal to 8½d. in the pound on the district rate, the Railway Company, being rated at £4789, received by way of reduced rates out of the net profit, to which they did not contribute, the sum of £164 12s. 10d. This he did not consider fair treatment to the other gas consumers. With regard to the alleged deficiences in the sinking fund and reserve fund, he suggested that some definite statement should be submitted by the Committee as to how they proposed to set these matters right.

After a long discussion, in the course of which the report and Mr. Geen's reply thereto were freely criticized, it was decided that the Committee be requested to consider and state to the Council, in view of Mr. Lass's report, at what price gas ought to be sold to the Railway Company, also as to what course they recommended the Council to adopt with regard to the sinking and reserve funds, and generally to make recommendations upon the report.

Gas in Japan.—According to the statement of accounts presented at the last half-yearly meeting of the Tokio Gas Company, the total income for the six months ending Dec. 31 was £9400; and the expenditure, £5546—leaving a profit of £3854. A dividend at the rate of 8 per cent. per annum was declared.

THE TAUNTON TOWN COUNCIL AND ELECTRIC LIGHTING.

Our readers are aware that the Taunton Town Council have had lately under consideration the questions of purchasing the gas and electric light undertakings. With respect to the gas-works, the terms asked by the Directors of the Company—viz., 22½ years' purchase—were regarded as too high, as the acquisition of the concern on these conditions would burden the rates to the extent of £200 a year. This matter, therefore, was allowed to drop; and attention was concentrated upon the Electric Light Company's undertaking. It is unnecessary now to comment upon this decision; the matter being done with. All that need be said is that the Corporation let slip a business that was certainly paying its way, and had every prospect of continuing to do so. This, judging from recent events, is more than can be said for its rival; for, as stated in the JOURNAL last week, there was so serious a deficit on last year's working that the shareholders have given the Directors *carte blanche* to do the best they can for them. This serious position of affairs could scarcely have been unknown to the townspeople; yet their representatives could not keep their eyes off the electric light undertaking, and they accordingly gave instructions to the Finance and General Purposes Committee to report to them on the subject of purchase. The Town Clerk also put himself in communication with the Board of Trade and the Local Government Board on the matter, and had a personal interview with one of the officials of the former department. The Committee's report, embodying all the information obtained, was submitted to the Council at a special meeting held on Tuesday last. In it they suggested that, in the event of the Corporation deciding to purchase, a Licence, which could be granted by August next, should be obtained for a limited period—say, three years—and that the Local Government Board be asked to hold an inquiry in the autumn of the present year, and give their sanction for a loan, to be repaid in three years if the Council do not obtain a Provisional Order, and for 30 years if they did. The Council could then, they said, take over the works, and carry on the business until the Order could be obtained, which would probably be in August, 1893; and until that time it would be impossible to borrow to repay the purchase-money. The Board of Trade should also be asked to allow the Council three years before they should be required to carry the wires underground. Accompanying the Committee's report was one by the Borough Surveyor (Mr. J. H. Smith) on the buildings and plant of the Electric Lighting Company. He gave the cost of the former (with land) as £3092 2s. 3d., deducting 5 per cent. for depreciation, although, with few exceptions, the works are comparatively new. The plant on which he allowed 10 per cent. for depreciation, he put at £7354 15s. 4d.; making together a total of £10,446 17s. 7d., brought up to £10,497 17s. 7d. by a few miscellaneous items. After making some observations upon the plant generally, and offering certain suggestions for its more efficient working, Mr. Smith went on to say that the vertical high-speed engines were working at much below their proper load with the 515 incandescent lamps wired, and that 785 lamps more could be supplied with the same power—thus adding £500 per annum to the revenue. The profits derived from the supply of electricity to private consumers would, he said, increase rapidly with the extension of the demand, as the staff and other expenses would be sufficient to work a much larger number of lamps than those enumerated. The charge of 6d. per Board of Trade unit for private lighting would be equivalent to 3s. 6d. per 1000 cubic feet of coal gas; and in some towns it was considered that an 8-candle power incandescent lamp would light interiors equally as well as, if not better than, gas-jets with the illuminating power of 14 candles. The prices varied somewhat in different towns, but the average charge per annum was as follows: 8-candle power lamps, suitable for bed-rooms, 8s.; 10-candle power lamps, suitable for sitting-rooms, 14s.; similar lamps for passage and hall, 16s.; 1200-candle power arc lamps (2000 hours), £23 15s.; 16-candle power incandescent lamps (3250 hours), £6 15s.; 32-candle power ditto, £9 18s. Mr. Smith said it was not possible to give an exact estimate of the cost of extending the supply to a larger area than the one now served; but it might be taken roughly at £50 for each arc light and lamp complete, and £10 for each 32-candle power incandescent lamp. He pointed out that electricity and electric lighting were being rapidly cheapened; so that incandescent lamps which now cost 3s. 6d. would, as from next year, be sold at 1s. 6d. each. He found that one indicated horse power might be taken to produce 140 candles in incandescent lamps; the same power would be equal to 860 candles of arc light. Consequently, the arc system of lighting was by far the best for all main thoroughfares. At the same time, some towns were using incandescent lamps in the side streets, by placing them in old gas-lanterns, which was found to be economical. Therefore 32-candle power lamps would have to be used in main streets, so that there would be 196 of these lamps available; and this would mean as many gas-jets shut off at £2 8s. per annum. He calculated that the saving on coal would be at least £100; on oil and waste, £50; and on water, £35—making a total of £185. On the subject of measuring the supply, he expressed the opinion that the introduction of recording meters would be satisfactory to the consumers as well as to the suppliers of electricity. Accompanying the report were four statements, setting out the present income and expenditure of the Company, the probable increase in the income by the adoption of the meter system, the capacity of the works for extension, and a similar statement based on the charge for light being at a lower rate. The first statement showed the income for the past year to have been £1521; and the various payments and liabilities, £2267—leaving a deficit of £746. According to the second statement, the estimated income under the supply by meter, at 6d. per unit, would be £2098, or £2148 with the addition of the meter-rent. With the working expenses, &c., as before, *plus* the instalment in liquidation of the amount borrowed for the meters—in all £2293—the deficit would be only £145. Utilized up to their full capacity, however, the works were shown to be equal to realizing a profit of £1235; or supposing a lower rate were charged for the light, one of £560.

The electric light question has naturally been the subject of much newspaper correspondence which cannot be dealt with here. One letter, however, from a writer who appropriately adopted the *nom de*

plume of "Querist," from the very pertinent questions he raised in the course of his communication, must not be passed over. He began by pointing out that, in the second statement, £2098 was estimated to be the income of the works if the present output were charged at 6d. per unit—equal to 83,920 units at 6d. The actual working expenses for the past year were £1947 2s. 9d., which works out to 5·45d. (say, 5½d.) per unit, without any allowance for depreciation, interest, or sinking fund, and with many other deficiencies. He then proceeded as follows: "The estimate of savings to be effected over the working of a Company with a brand new plant, working for dear life, are about as reliable as those which have been regularly circulated at the end of each year of the Company's existence, and as regularly falsified by events in the year succeeding their publication. The original cost of the plant was £13,086 19s. 7d. The sum entered in all the estimates for repairs and renewals is £225 os. 7d.; being 1·72d. (say, 1¾d.) per cent. on the original cost. Preposterous! Nothing is entered for depreciation, although the Borough Surveyor himself reports that at least 10 per cent. per annum should be deducted for depreciation. The amounts are thus incorrect to the extent of £1300 a year on each statement. The Board of Trade require the wires to be put underground in a reasonably short time—say, three years, as suggested by the Committee. The town is to pay £1588 for these wires, posts, &c., which are to be taken down and sold for what they will fetch, and underground wires substituted at a cost of about £4000. Nothing is entered in either statement for capital nor the charge for sinking fund thereon, amounting to over £200 a year. In the third statement, 18 arc lamps are to be run (25 per cent. additional), and nothing is entered for carbons or attendance—say, £35 a year. Also £500 expended for meters and £1100 on extension. Nothing whatever is entered for repairs or depreciation on these new items; this would cost at least another £200 a year. The income from it is entered. The Borough Surveyor says 6d. per unit equals 3s. 6d. per 1000 cubic feet for gas. The Company have been supplying current at 2½d. a unit, which, on a relative calculation, equals 1s. 6d. per 1000 cubic feet for gas. Does he not think that, if the supposed comparison were true, everybody would have taken the new light years ago? Here are the comparative costs, allowing for a renewal of one electric lamp for each 500 hours, and 1s. per lamp per year for the use of the meter:—

Electric Light at 6d. per Unit.				Gas at 3s. 9d. per 1000 Cubic Feet.			
Burning till 9.00 p.m.	16 c. p.	£1 18 8	..	6 c. ft. per hour	£1 5 2
„ 11.30 „	16 „	3 8 6	..	6 „	1 18 6
„ 9.00 „	32 „	3 12 6	..	12 „	2 10 0
„ 11.30 „	32 „	6 6 0	..	12	3 15 0

Now, 16-candle lamps are at present charged not exceeding £1 1s. a year, including renewals of lamps; and 32-candle lamps, under £2. How many customers of the Company will pay the charges, especially those who need the lamps till 11 o'clock p.m.? It is possible to purchase new plant, which will do the work more economically than that now in use, for less money than the estimated present value of the latter. Ought we not to have correct—that is to say, complete and accurate, instead of grossly incomplete and inaccurate accounts submitted to us before being asked to vote? Ought not the Council to investigate, so as to ascertain if it has the power to charge, and all the consumers the will and the ability to pay, the increased (doubled or trebled) charges which are necessary to make the business approach a paying point? Having these queries answered, ought we not to have (say) three months to consider the figures? and, if so, why are folks trying to rush us into an unprofitable speculation?" With this string of questions, the writer closed his letter.

The whole subject was considered at a numerously attended public meeting held on Monday evening last week, under the presidency of the Mayor (Alderman Chapman). The proceedings were throughout somewhat lively; and in the end the following motion, submitted by Alderman Standfast—"That it is not advisable at the present time that the Town Council purchase the works of the Electric Light Company"—was carried by a small majority. A special meeting of the Town Council was held the following morning to discuss the matter. The report of the Committee, summarized above, was presented, as was also the Borough Surveyor's report; and their adoption was moved by the Mayor, and seconded by Alderman Van Trump. A sharp debate ensued; and eventually Alderman Spiller proposed that the matter should be adjourned for a month, and the Committee empowered in the meantime to employ an expert, at a cost not exceeding 50 guineas, to prepare a report upon the suitability of the present buildings and plant for the lighting of the town by electricity. Alderman Farrant seconded the motion; and, after considerable discussion, it was agreed to. It was also decided that another special meeting of the Council should be held on the 21st prox. A motion of Alderman Standfast, that the books of the Company should be submitted to the Council for inspection, was lost.

THE PUBLIC LIGHTING AND ROADS OF KENSINGTON.

At a Meeting of the Incorporated Association of Municipal and County Engineers held at the Town Hall, Kensington, on the 12th inst., Mr. W. WEAVER, M. Inst. C. E., the Surveyor to the Vestry, read a paper dealing with the various matters under his supervision.

With regard to the lighting of the parish, the author explained that it is all within the area supplied by The Gaslight and Coke Company. There are 4329 public lamps in the streets, of which number 32 are refuge-lamps, with 50 or 100 candle power burners. The lamps are lighted on the average meter system—a meter being fixed to about every 20 lamps. The lamps are fixed, lighted, extinguished, cleaned and repaired by the Vestry's own staff of 42 lamplighters and 8 supernumeraries, 1 foreman, and 4 workmen; the whole being under the direction of Mr. Monson, the Lighting Engineer. The lamp governors are regulated to pass 4·5 cubic feet of gas per hour; the price charged for gas at Lady-day, 1891, was 2s. 2d. per 1000 cubic feet. The cost per lamp was £2 14s. 1d.; and the lighting rate 1¾d. in the pound. The working of the average meter system commenced in 1877; and its economy and advantages over the old system of a fixed annual payment, amounting to £3 8s. 2d. per lamp, will be seen by taking three years of the old, and three of the new system. In 1873 under the old system, and the burners regulated to consume 3 cubic feet of gas per hour, the lighting rate was 3½d. in the pound; in 1874, it was 3¼d.; and in 1875, it was 3¼d. In 1877, under the new average meter system, the Vestry having the control of the lighting and repairs, and paying only for the actual quantity of gas consumed, with the burners regulated to pass 4·5 cubic feet per hour, and giving upwards of 50 per cent. more light, the rate was 1⅞d. in the pound; in 1888, it was 2d.; and in 1889, it was 1½d. Not any of the public street-lamps are permanently lighted by electricity, although some of the refuge-lamps have been so lighted experimentally. With regard to the Electric Lighting Act, the author advised the Vestry to make an application for a Provisional Order and undertake the work themselves. Looking to the enormous amount which would have to be raised, and the probable discontent of residents in districts outside the first areas lighted, the Vestry deemed it preferable to divide the parish into six areas, which have been allotted to five Companies—viz., the London Electric Supply Corporation, Limited; the Notting Hill Electric Lighting Company, Limited; Kensington and Knightsbridge Electric Lighting Company, Limited; the Chelsea Electricity Supply Company, Limited; the House-to-House Electric Light Supply Company, Limited. The last-mentioned Company undertake the lighting of two areas. The system of supply adopted by the whole of the Companies (except the House-to-House Company) is arranged on the low-tension system. The House-to-House Company's system is an alternating current transformer high-pressure supply, with high-pressure service lines from distributing mains, and transformers on the consumers' premises. The Provisional Order granted to this Company contains a condition that, so soon as the amount of supply in the district appears to warrant it, the Company may be called upon by the Board of Trade to establish distributing stations and lay mains worked at a low pressure. About 15 miles of roads and footpaths have been opened up for the purpose of laying electric mains in the parish. In some cases the conductors have been placed in brick or concrete culverts; in other places, bitumen tubes or iron pipes have been used. In some streets it has been a matter of extreme difficulty to find space in which to lay the mains; and the author expressed the opinion that all the principal roads, at any rate, should have a subway. Stoneware pipes for the reception of the gas and water services and electric wires could be laid from the subway to vaults; and if these pipes were laid in the drain trenches, the cost of the stoneware pipes would be the only extra expense beyond the subway. The author thought that, if the cost of such subway works were defrayed by a loan spread over 50 years, the various companies could be charged a rent which it would be economical for them to pay, and sufficient to return a profit on the outlay. At the same time the appearance of the roads and footpaths would, he considered, be vastly improved, and the comfort and safety of the public enhanced.

Dealing with the subject of the roads in the parish (of which, at Ladyday last year, there were 82¼ miles under the charge of the Vestry), the author referred to the use of steam-rollers for consolidating the surface. He said that two 10-ton steam-rollers are now employed; the 15-ton roller formerly used having been taken off, and utilized as a stationary engine for working a circular saw, and cutting wood paving blocks and timber for wheelwright's work. He explained that the stoppage of that roller on outside work was ordered, upon The Gaslight and Coke Company obtaining an injunction, restraining the Vestry from using steam-rollers to the damage of the Company's mains and services. The Court of Appeal subsequently somewhat modified the injunction, by limiting the liability for damage to mains, &c., properly laid. The author made the following remarks on this matter: "The present state of the law, therefore, is that every authority using a steam-roller is liable for all damage to mains and pipes, unless it can be proved that they were not properly laid. The actual cost of repairing a damaged main is of very little moment, compared with the incidental compensation which may arise from a consequent explosion and loss of life. As the result of a conference of Metropolitan Vestries held at Kensington, the London County Council last year inserted a clause in their Various Powers Bill, legalizing the use of rollers not exceeding 10 tons in weight without liability for damage to mains, if laid at a less depth than 2 feet. The Committee of the House, however, rejected the clause. This result, in the author's opinion, was mainly brought about by the evidence of Sir Frederick Bramwell, who appeared on behalf of the Gas Company. When asked for his opinion on the clause, Sir F. Bramwell replied that it was 'perfectly absurd, as it sought to exempt from liability the only persons who could cause the damage.' No attempt was made by the London County Council to refute this evidence, by producing witnesses to testify to fractures prior to steam-rollers being used, or to trollies traversing the streets, conveying weights giving double and treble the pressure per inch of tyre as compared with steam-rollers." The author went on to say that he had dealt somewhat fully with the subject of steam-rolling, as at the present moment every road surveyor in the country occupies a very unsafe position. An explosion arising from a fractured gas-main may happen any day; causing loss of life and damage to property, involving heavy compensation. If a steam-roller has been recently working on the adjacent road, the authority using the roller will only escape liability for the entire consequences by proving that the fractured main was not properly laid; and such proof was, he said, extremely difficult of demonstration.

Thirsk Gas Company.—The profits of this Company on last year's working amounted to £656, which was a slight increase over 1890. The figure would have been still larger had there not been exceptional expenditure in renewing and fixing new services, consequent on the reduction in the price of gas and in the rental of meters. At the recent annual meeting, a dividend was declared, which, with the interim payment, made 5¼ per cent. for the year.

New Joint-Stock Company.—The Common Petroleum Engine Syndicate, Limited, has been registered with a capital of £20,000, in £1 shares, to carry into effect an agreement made between Spiel's Patent Petroleum Engine Company, Limited, of the one part, and J. Elsner, on behalf of the Syndicate, of the other part, for the acquisition and working of certain patents relating to improvements in gas, petroleum, and other hydrocarbon motors.

METROPOLIS WATER SUPPLY.

The Quality of the Water in February.

The returns furnished to the Registrar-General by the London Water Companies as to the water supply of the Metropolis during the past month, show that the average daily supply was 180,123,530 gallons, as compared with 180,491,255 gallons in the corresponding month of 1891; being at the rate of 29·5 gallons per head of the population. Of the entire bulk of water sent out, 90,749,666 gallons were drawn from the Thames, and 89,373,864 gallons from the Lea and other sources. Reporting upon the quality of the supply, Dr. E. Frankland said: "Taking the average amount of organic impurity contained in a given volume of the Kent Company's water during the nine years ending December, 1876, as unity, the proportional amount contained in an equal volume of water supplied by each of the Metropolitan Water Companies and by the Tottenham Local Board of Health was: Kent, 0·9; Tottenham, 1·0; New River, 1·9; Colne Valley, 2·1; East London (deep-well), 2·2; East London (river supply), 2·8; Southwark, 3·2; West Middlesex and Grand Junction, 3·4; Chelsea, 3·5; and Lambeth, 3·6. The water abstracted from the Thames by the Chelsea, West Middlesex, Southwark, Grand Junction, and Lambeth Companies was of much better average quality in February than in the previous month. It was efficiently filtered in all cases. The water taken chiefly from the Lea by the New River Company had returned to its usual degree of purity; while that taken from the same river by the East London Company was superior to the best Thames-derived waters. Both waters were efficiently filtered. The deep-well waters of the Kent, Colne Valley, and East London Companies, and of the Tottenham Local Board of Health, were of good quality for dietetic use; those of the Kent Company and the Tottenham Board of Health being especially distinguished for their excellence. The Colne Valley Company's water, having been softened before delivery, was rendered suitable for washing. All these waters were clear and bright without filtration. Seen through a stratum 2 feet deep, the Kent, Colne Valley, and Tottenham waters were clear and colourless; the East London (deep well) clear and nearly colourless; and the remaining waters clear and very pale yellow. The bacteriological examination by Dr. Koch's process of gelatine plate culture, gave the following results: One cubic centimetre of each water, collected on the same days as the samples for chemical analysis, developed the following numbers of colonies of microbes: West Middlesex, 16; Kent, 24; New River, 36; Lambeth, 38; Grand Junction, 46; Chelsea, 60; East London (river supply), 126; and Southwark, 348."

Messrs. Crookes, Odling, and (the late) Dr. Tidy, in the course of their report to the Official Water Examiner for the Metropolis (General A. de Courcy Scott) on the quality of the water supplied by the London Water Companies during the past month, as shown by samples taken daily for analysis, say: "The whole of the 175 samples examined were found to be clear, bright, and efficiently filtered. In other respects, also, the condition of the water supply during February was throughout entirely satisfactory. In the case of the Lea-derived water supplied by the East London Company, the mean amount of organic carbon was found to be only 0·125 part, and the maximum amount 0·157 part, in 100,000 parts of the water. In the case of the Thames-derived supply, the mean amount of organic carbon was only 0·137 part, and the maximum, in any single sample examined, 0·151 part in 100,000 parts of the water; as against a mean of 0·158 part, and maxima of 0·189 and 0·204 part, in the previous month's supply." A novelty in connection with the report of the above-named analysts for the past month is the inclusion therein of an additional table giving the results of tests of samples of the Companies' waters taken from the works on various days. This allows of a comparison being made between its condition there and at the places whence the samples are usually drawn from the mains.

LIVERPOOL CORPORATION WATER SUPPLY.

Completion of the Boring of the Mersey Tunnel.

The interesting news was received at Liverpool last Tuesday that the tunnel under the Mersey, through which water from the Vyrnwy Lake is to flow, had been successfully bored through from shaft to shaft. The work was commenced in March, 1888, by Messrs. Monk and Newell; and since the abandonment of the contract by them, it has been carried on, on behalf of the Corporation, by Messrs. J. Cochrane and Sons, of London. The former contractors had sunk a shaft on each bank of the Mersey, and had driven a tunnel 57 ft. 6 in. long from the Cheshire side, at a very low level. Messrs. Cochrane introduced more expensive machinery, including four new air-pressers, several 40-horse power boilers, portable engines, a new boring shield, and substituted electric light for candles. They sunk a new shaft on the Cheshire bank; and, utilizing the top portion of the existing Lancashire shaft, proceeded to drive a new tunnel across at a much higher level and with a greatly reduced air pressure. Generally speaking, the new apparatus has proved a success all along. Owing to the sandy water-bearing strata traversed, the boring had to be done by the aid of compressed air, which served to keep the loose earth in check; and in spite of the water having burst through on several occasions, causing considerable delays, the work has proceeded with phenomenal rapidity, until last Tuesday the whole length of 805 feet from centre to centre was accomplished. The tunnel and shafts are being lined with cast-iron segments, each ring of which measures 18 inches in length 1$\frac{1}{16}$ inches in thickness, and 6 inches at the flanges, and weighs 2 tons 4 cwt. The diameter of the tunnel inside the flanges is 9 feet; so that there will be room for more than the two pipes which are at present intended to carry the water through at a pressure of 180 lbs. per square inch. A great deal of work has yet to be done before the completion of the tunnel and shafts; a quantity of earth having to be removed and the cast-iron lining finished. The fixing of the pipes to conduct the water through will form a separate contract; and when this shall have been accomplished, nothing will remain but to divert the water from the temporary pipe-line into the aqueducts under both the Ship Canal and the Mersey, and thence into the pipes leading into the Prescot reservoir.

PLYMOUTH CORPORATION WATER SUPPLY.

A New Storeage Reservoir—Water Power for Electrical Purposes.

It will be remembered that, after the blizzard of 1891, there was a good deal of controversy at Plymouth as to what ought to be done to protect the leat, so as to prevent a stoppage in the supply of water. Some members of the Council were in favour of piping; others advocated a plan for roofing it with concrete; and the idea of a storeage reservoir was also mooted. It was generally felt, however, that it would be unwise to commit the Council to a large expenditure on any definite scheme until after the new Water Engineer (Mr. Sandeman) had been able to give them the benefit of his advice. One of his first tasks, therefore, was to investigate the general condition of the water supply, and to report upon what he considered desirable to be done in view of the present and future requirements of the town. His report has now been published; and the result of his investigation is that he proposes the construction of a storeage reservoir at Burrator, and the laying of a direct line of pipes from the proposed reservoir to the Roborough reservoir. The Burrator site, said Mr. Sandeman, is, by its configuration, naturally adapted for the formation of a reservoir; and here one could be formed, with a capacity of 422 million gallons, for, it is estimated, £96,000, including the dams, overflow, gauge, weir, road diversion, valves, &c., but not the cost of the land. The reservoir could be designed so that, when requisite, its storeage capacity could be increased (at small cost) by 350 million gallons by raising the dams 10 feet higher; making the total storeage capacity 800 million gallons. The cost of the pipe-line to Roborough is estimated at £24,000; and the leat will remain as a duplicate means of supply between Burrator and Roborough. Later on in the report, Mr. Sandeman deals with the question of water power. He says, assuming the town to be in possession of storeage capacity sufficient to ensure a daily supply of 6 million gallons, the energy available by utilizing the fall from one reservoir to another would be as follows: Roborough to Hartley, 260-horse power; Hartley to Drake's Place (by a new main), 78-horse power; by enlarging the main from Burrator to Roborough to 30 inches, in order to reduce the friction in the pipes, 126-horse power. This gives a total gross horse power of 464; and after deducting the friction in the pipes, turbines, &c., a net horse power of 175. It should be remembered, observes the Engineer, that this power is continuous through the twenty-four hours; and if it be found advisable at some future time to introduce into the town the system of supplying water power at high pressures (600 or 700 lbs. per square inch), for the use of small traders and manufacturers in place of steam power, the means of producing hydraulic power by day and electric light by night are here present. Appendices to the report give analyses of the water by Mr. R. H. Harland, F.I.C., F.C.S., Analyst to the Greenwich Board of Works; and he pronounces the samples to be "excellent waters for drinking and domestic purposes." A report on the scheme by Mr. James Mansergh, C.E., is also given; and his opinion is altogether in favour of it.

Tynemouth Gas Company.—The annual report of the Directors of this Company, to be submitted to the shareholders at their meeting to-day, states that the revenue for the past year amounted to £28,663, and the expenditure to £23,204. After writing off £510 for depreciation of meters, stoves, &c., and charging £715 (the cost of two new boilers) to revenue account, there is a balance of net profit of £5459. An interim dividend of 5 per cent. on the original capital and 3½ per cent. on the new share capital was paid on Sept. 4 last, amounting in all to £2859; and the Directors propose to make a like payment for the half year ending Dec. 31 last. The two payments will amount to the statutory dividend for the year. The Directors state that they have found it necessary, on the advice of their Engineer (Mr. W. Hardie, jun.) to replace two boilers, which had been in constant use since the new works were erected in 1872, by two patent Galloway boilers of steel, at a cost of £715. They are fitted with Meldrum's patent dust-fuel furnaces, so as to consume the refuse from the coke; and this will in future effect a considerable saving in the consumption of coke on the works. Owing to the increased consumption of gas, it will also be requisite to lay down several new mains of a larger size during the present year. The great increase in the cost of coal has been a cause of much anxiety; but there is every prospect of securing a more favourable contract on the expiration of the old one. A new show-room has been completed; and a great variety of the latest appliances for cooking, heating, &c., are now on view. There are 205 cooking-stoves let out on hire; and the Directors have every reason to be satisfied with this new departure.

Bristol Water Company.—The report presented by the Directors of this Company at the forty-sixth annual meeting last Saturday stated that the revenue from water-rates for the past year was £92,607; being an increase of £3548. The sum shown by the revenue account to be applicable for dividend was £18,986; and the Directors recommended that dividends of 3¾ per cent. on the ordinary £25, £20, £6, and £4 10s. shares, and of £2 12s. 6d. per cent. on the 7 per cent. maximum ordinary stock, be declared; making, with the intermediate dividends, 7½ per cent. on the ordinary shares and 5¼ per cent. on the 7 per cent. maximum ordinary stock for the year, and leaving £849 to be carried forward. The Sanitary Authority having expressed a desire that the Company should take steps to prevent, so far as possible, the necessity for breaking up the surface of roads newly laid with wood pavement, the Directors mentioned that they had with that object laid new mains in several important streets; and the exceptional expense so incurred and charged to revenue was £904. The interest on the capital expended on the Barrow new reservoir had been charged to revenue from Jan. 1, 1891; and to this fact was attributable the reduction of the dividend compared with that paid for 1890. The total quantity of water now stored in the three Barrow reservoirs was 715 million gallons, of which 370 millions were stored in the new reservoir. The additional storeage capacity afforded by the new reservoir would, it was believed, enable the Directors this year to effect a considerable saving in the expenditure on pumping at Chelvey. The works in the Yeo Valley were being proceeded with. The capital expended during the year was £57,216; and the length of service mains laid was about 6½ miles.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

The Custodiers of the Wallace Monument at Stirling had before them on Monday an application by Mr. Carlow, of Arbroath, on behalf of the North British Association of Gas Managers, for leave to place the bust of Wm. Murdoch in the Monument, as resolved upon at the meeting in Edinburgh last July. The application asked that it be placed in a suitable place in the monument. Provost Kinross, of Stirling, who presided, said they had all received a somewhat lengthy account of the history of Murdoch; and he moved that they accept the offer of a bust, and instruct a Committee to make arrangements for its reception. He had been consulted, he said, as to whether a bronze or a marble bust should be given; and he had replied that he had not a good impression of the bronze bust of Carlyle, and that he would prefer a marble bust on a pedestal. I think it requires very little reading between the lines to perceive that, although Mr. Carlow laid before each of the Custodiers a full narrative of what Murdoch did, they had not all read it. I cannot otherwise account for a show of opposition which was offered, not to the acceptance of the bust, but to the placing of it in the hall where the other existing busts are. No one surely who had taken the trouble to make himself acquainted with Murdoch's work, could doubt that he is as much entitled to the highest honour which can be bestowed as any Scotchman whose name might be mentioned. His invention is quite on a level with that of Watt, the inventor of the steam-engine; and it has been of more consequence to the world, I do not hesitate to say, than have the writings of Carlyle. Yet I find a Mr. Thomson saying "he thought they should not cheapen the Monument in any way;" and that "it was the intention at first, when the bust idea was entertained, that they ought to admit to the chief room of the Monument only those Scotchmen who had a distinct claim to be admitted, and though Murdoch's bust was worthy to be received, yet they should take up the question as to whether it should not be placed in another hall in the building." Another member of the Board, Treasurer Ronald, dissented against the placing of the bust of Murdoch in the hall along with the others. Happily these two stood alone; and the bust was accepted on the same conditions as the others—viz., that the Custodiers have power to shift it if it should be necessary. The presentation of it will take place at the annual meeting of the North British Association in July.

On account of their not having been able to submit the Committee minutes for the month at their annual meeting last week, the Edinburgh and Leith Gas Commissioners are to hold their ordinary monthly meeting on Monday, contrary to the resolutions they had arrived at. I understand the chief business before them will be a recommendation that the present price of gas—4s. 6d. per 1000 cubic feet—should be continued till after the autumn reading of the meters. By that time, they will have ascertained the results of the working for this year, and will have entered into their contracts for the year which will be then current. It is most probable there will be a reduction in the price of gas.

It is announced that the Dundee Gas Commissioners will probably be in a position, at the end of this year, to reduce the price of gas. The increase in the output, to which I referred last week, is now stated to amount to 34,750,000 cubic feet over the estimate. This has been attained in spite of the starting of several installations of electric light; and it shows the business of the Gas Commission to be in a very healthy condition. An unusual source of saving, for it cannot be called revenue, has arisen in connection with the new contracts for coal, which were entered into on the original contracts being cancelled as not fulfilling the guarantee. The question for the Commissioners is whether they will materially reduce the price of gas or apply the surplus which is expected in strengthening the contingent fund, which is regarded by some as not being in a satisfactory position. Probably they will be able to do both to some extent.

The members of the Aberdeen Town Council on Tuesday inspected the stoking and coal-breaking machinery which was erected in their works over a year ago by Mr. John West, and agreed to take the plant off Mr. West's hands. Bailie M'Kenzie, the Convener of the Committee, stated that the machinery had given every satisfaction; and as they were that day to pass Mr. West's account for payment, it was thought desirable that the members of the Council should be taken to see it. The machinery was inspected at work; and everyone appeared to be satisfied with it. A general inspection of the gas-works was made at the same time; a thing which, considering how ill-informed many members of corporations are upon gas matters, might be done with advantage in other places. The Gas Committee met on the following day; and it was reported to them that the gas had been tested twice during the past month, and had been found to be of 22·34 and 23·5 candle power. The consumption of gas showed an increase over the corresponding month of last year of about 5 million cubic feet.

At the meeting of the Stirling Town Council already alluded to, a letter was submitted which had been received by the Lighting Committee from the Secretary of the Gas Company, announcing the reduction in the price of gas mentioned in last week's "Notes." The minutes stated that the Committee had instructed the Town Clerk to write to the Gas Company, expressing their pleasure at the reduction, and to ascertain what reduction would be made on the price charged for gas used in the public lamps; and that a reply had been received to the effect that the gas consumed in the public lamps would be charged on the reduced scale. At the same meeting, the question of the advisability of the Town Council taking over the gas-works for the benefit of the town came up in an indirect way. The question was brought before the Council on the motion of Mr. Dougall last November, and remitted to the Lighting Committee for inquiry and report; that gentleman being added to the Committee to assist in the deliberations. In the report which the Committee submitted last Monday, they said that they had considered the motion as to the proposed purchase, and continued the matter for further consideration. Mr. Lawson moved the approval of the minute; and pointed out that Mr. Dougall was no longer a member of Council. After some talk, it was agreed to continue the remit to the Lighting Committee. Mr. Dougall told the Council in November that there was no middle course, and that the issue was either acquisition or opposition. A local journal says that acquiescence in the present state of things is more likely to be the solution of the question; and that the laughter with which the motion to continue the remit was received, showed that the Council as a whole entertained a similar belief. The fact of three months having elapsed without the Lighting Committee being able to report, was either a testimony to difficulties having turned up that were not expected, or to there being a desire to allow the matter gradually to drop out of sight.

At the last monthly meeting of the Paisley Town Council, the allocation of last year's gas surplus was trotted out, with the result that the grasping disposition of those Councillors who think it is not improper to seize the gas profits for the improvement of the town, met with complete discomfiture. The ringleader was again ex-Provost Cochran, who moved that of the surplus of £8238, the sum of £4238 be devoted to defray the debts of the Gas Trust, and the balance of £4000 be given to improve the town. In support of his motion, the ex-Provost pointed to the extensive improvements which had been carried out by means of the gas surpluses, remarking that they had spent fully £30,000 in that direction. The burden of this was borne, he said, by householders paying rents of £10 and upwards, the poorer classes paying only one-sixth. That was one of his principal reasons for asking a continuance of the system. There were many things, such as repairs and improvements on their town, which they could not tax the community for, and these the surpluses enabled them to carry out. If they did not continue the utilization of the surpluses for town improvements, they would have to impose a tax of 4d. in the £1. He hoped that the Council would show their good sense, and do what they had done for a great many years. The motion was seconded by ex-Bailie Andrews, who remarked that he concurred in the views of ex-Provost Cochran. Sympathy with those views was also expressed by ex-Provost Clark, who wished, however, to know for his guidance if the Gas Act did not require that the Trust should first wipe away their deficit before they could say that they had a balance to dispose of for public improvements. The Clerk (Mr. Martin) stated that, construing the Act strictly, they must first of all apply the money towards the payment of the debt incurred for extension and improvement of the works and mains, before they could give anything towards improving the town. They had now exceeded their borrowing powers; but as soon as they had paid off the excess, they would be able again to spend the surplus on improvements. The Convener of the Gas Committee then formally moved that the surplus be applied, in terms of the Act, to pay off the debt. This was seconded and agreed to.

The failure of John Dobbie, Sons, and Co. is giving the Arbroath Gas Corporation some trouble. Messrs. Chiene and Tait, of Edinburgh, have made up a statement regarding the estate, which shows the liabilities of the firm to amount to £18,079 7s. 6d., and the assets to £17,103 10s. 4d.; leaving a deficiency of £975 17s. 2d. The Committee of Management of the Arbroath Gas Corporation have resolved to take action in the Sheriff Court to compel the Messrs. Dobbie and their cautioner to take delivery of the residuals.

Messrs. Leslie and Reid, of Edinburgh, have been appointed Engineers to the Falkirk and District Water Trust, in connection with the re-construction of the embankment of Earl's Burn Reservoir under the arbitration proceedings between the Trust and the contractors. They propose that the work should be begun early in May.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March 26.*

Sulphate of Ammonia.—There is nothing fresh to be reported. The market is steady, and the demand apparently sufficient to prevent an increase of stocks; and as parcels are not pressed for sale, prices are entirely unchanged. East coast buyers will, as a rule, not exceed £10 3s. 9d.; but the bulk of the business is nevertheless at £10 5s., and £10 2s. 6d. has been realized at Liverpool, though lower quotations are floating about. Nitrate is still very quiet, and is now offering at 9s. 1½d.; but there is a steadier feeling at the close.

LONDON, *March 26.*

Tar Products.—Business is very dull; and buyers are few and far between. The transactions that have been noted are at low and unprofitable prices. Pitch is the only product which seems to interest buyers; but business in this article can only be done at a very considerable reduction on to-day's quotation. Both tar and oils are now being largely burnt as fuel; and, taking into account the prices offered for products, this seems at the moment the best outlet for them. Prices: Tar, 12s. 6d. Pitch, 28s. 6d. Benzol, 90 per cent., 2s.; 50 per cent., 1s. 6d. Toluol, 1s. 4d. Solvent naphtha, 1s. 3d. Crude benzol naphtha, 30 per cent., 10½d. Creosote, ¾d. Naphthalene salts, 20s.; pressed, 45s. Carbolic crude, 60's., 1s.; 70's, 1s. 4d.; crystals, 4¾d. Cresol, 8d. Anthracene, 30 per cent. "A" quality, 11d.; "B," 8d.

Sulphate of Ammonia.—A better feeling has come over this market; and sales are not so difficult. Considerable business is being done at prices ranging from £10 to £10 5s. less 3½ per cent. It is believed that the bottom of this article has been reached; and that, with the advent of spring, better prices will obtain. Gas liquor (10 oz.) is quoted at 5s. 6d. to 7s.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—During the past week there has been a more or less general stagnation of demand throughout the Lancashire district; and with the resumption of work at the collieries (which with very few exceptions was restarted on the 21st), the output has been considerably in excess of present requirements. In the place of the previous needless anxiety on the part of merchants and consumers to get in extra supplies, colliery owners have had more coal to offer than they could dispose of; and although here and there an attempt has been made to hold on to some portion of the recent advance, it has been quite unsuccessful, and prices have promptly receded to old rates. For the present it is scarcely possible to form any really accurate

estimate as to the real condition of trade, as merchants and consumers in many cases are still holders of considerable stocks; and until these are worked off, only a limited demand can be looked for. Round coals, at the pit's mouth, do not average more than 12s. 6d. per ton for the best Wigan Arley, 10s. 6d. to 11s. for Pemberton four-feet and second qualities of Arley, and 9s. to 9s. 6d. for common round coals. Engine classes of fuel, upon which the advance was the greatest, are now the most plentiful in the market. Burgy is readily obtainable at 6s. to 7s. per ton; best qualities of slack, 5s. 6d.; and the common sorts, at 3s. 6d. to 4s. per ton, at the pit. In the shipping trade, there has been very little doing; and with plentiful supplies offering at the ports on the Mersey, for which it has been impossible to find buyers, prices have quickly gone back to about 10s. to 10s. 6d. per ton, for good ordinary qualities of steam coal delivered at the Garston Docks, or at the High Level, Liverpool.

Northern Coal Trade.—The effects of the strike in the Durham coal trade are now fully manifest; indeed, in some degree they are being overcome. Coal is being brought into the county from Scotland, Yorkshire, and Northumberland; so that, with the stoppage of many blast-furnaces and works, the difficulty is being removed, as far as absolute present needs are concerned. Northumbrian steam coal has fallen in price to something more like its normal rate; and it is now from 10s. 6d. to 11s. per ton, free on board, for best qualities. Second qualities are about 1s. per ton lower. Small steam coals are more abundant, at about 5s. per ton. In gas coals there is a lessened demand from London, which seems to be obtaining its supplies from other sources; and the high prices that were asked by a few of the Tyneside colliery-owners who can supply this kind of coal, have fallen. Still, from 13s. to 14s. per ton, free on board, is the current price. The demand being easier, lower rates may be anticipated soon. Bunker coals are slow; so many steamships lying idle just now. Manufacturing coals are quiet, with a very limited demand. Household coals are flat, with an abundant supply. Coke for blast-furnaces is, of course, extremely scarce, and commands about 20s. per ton at the ovens; but so many furnaces are out of use that the consumption is very small. Gas coke has been raised in price for retail sale; but it is the usual increase that takes place when the production is falling off. The strike in the coal trade shows some signs of settlement; more especially because the resources of the men are being rapidly drawn upon, and the funds of the Societies are small for the number of men (nearly 60,000) who are dependent upon them.

West of Scotland.—The coal trade in this district is reported rather easier. Shippers are still, however, engaged in working off old orders. The mild weather is telling upon the demand for household coal, which is materially reduced. There is a falling off in the trade to Ireland. Little or nothing continues to be done for the Continent except in nuts, of which foreigners are taking fair deliveries. For forward delivery there is but little inquiry, buyers holding off in the expectation of even a lower level of prices than prevailed before the recent spurt set in. Quotations, as it is, are down very considerably from what they were. Ell coal is offering at 8s. 9d. to 9s.; main, at 8s.; splint, at about 9s.; and steam, at 10s. 3d. to 10s. 6d. The shipments of Scotch coal for the week amounted to 147,200 tons, an increase over the preceding week of 18,713 tons. For the year to date, the shipments have reached 1,234,058 tons; as against 1,027,500 tons for the same period of last year—an increase of 206,558 tons.

Steam-Rollers and Gas-Mains.—Through an explosion of gas last Wednesday week, a house in South Street, Wilton, was wrecked, and a young man injured. It seems that shortly before the occurrence, a steam-roller had been used in the street; and it is conjectured that this fractured the gas-main, and the gas escaped into the sewer-pipe, and thence into the house.

Dorking Gas Company.—The half-yearly meeting of this Company was held on Monday last week. The report of the Directors showed a profit on the revenue account of £750, which, with the balance from the previous half year, left £1122 available for dividend. From this the Directors recommended the payment of dividends at the rate of 8 per cent. on the "A" and "B" shares, and 7 per cent. on the £10 per share paid on the "C" shares. The sale of gas was 7½ per cent. above that of the corresponding period of 1890; and this increase the Directors attributed to the extensive use of gas cooking and heating stoves. The report was adopted.

Celebration of the Third Anniversary of the Gas Workers' Union.—A great meeting of members of various Trade Unions was held at Barking last Sunday afternoon, to celebrate the third anniversary of the formation of the Gas Workers' and General Labourers' Union. It was estimated that about 25,000 people were present. There were two platforms provided for the speakers, among whom were Messrs. Burns and Thorne; and the following resolution was put from both: "That this mass meeting of trade unionists and others congratulates the Gas Workers' Union upon their third anniversary, and pledges itself to support no candidate for parliamentary or municipal vacancies who does not pledge himself to support a legal eight-hour day or 48-hours week, with a minimum wage of 6d. per hour." The resolution was carried.

Ammonia Gas Purifying and Alkali Company, Limited.—At the annual general meeting of this Company last Wednesday, the Directors reported that the net revenue for the past year amounted to £1415; being an advance of £431 on the receipts for 1890. There was an available balance of £2191, out of which the Directors recommended the declaration of a dividend of 5 per cent., free of income-tax. This absorbed £1122; and after paying the Directors' fees, there was a balance of £768 to be carried forward. In the previous report, and also at the last general meeting, reference was made to the difficulties experienced with the Company's plant at Belfast. The result of a personal inspection by three of the Directors and the Chemist (Professor Heaton, F.I.C., F.C.S.) was a decision to thoroughly overhaul it. This was accordingly done; and the purification arrangements are now reported to be in complete order. The royalties from the sulphur-recovery process continue to increase; the Halifax Corporation having been added to the Company's licensees during the present year.

Electric Lighting for Cambridge.—The Cambridge Town Council have adopted a recommendation of the Electric Lighting Committee, that the powers contained in their Provisional Order should be transferred to Messrs. Parsons and Co., who have undertaken to commence to light the specified area of supply not later than the beginning of the October term.

Southend Gas Company.—At the annual general meeting of this Company last Thursday—Mr. C. F. Woosnam in the chair—the report of the Directors and the statement of accounts for the past year (briefly noticed in the JOURNAL last week) were taken as read. The Chairman moved the adoption of the report; and the motion was carried unanimously. The statutory dividends were declared; and the proceedings closed with votes of thanks to the Chairman, Directors, and officers of the Company.

The Vyrnwy Water and Lead-Poisoning.—The *Chester Chronicle* says there is grave reason to fear that the Vyrnwy water contains elements very seriously impregnating the water when it comes into contact with lead pipes. At Liverpool, for eleven days in succession, lead was found in the water, although the city is only receiving a moiety of the Vyrnwy water, while Malpas is having its whole supply from that source now; and as the houses are nearly all supplied through lead pipes, our contemporary says it is none too soon to call attention to this serious matter.

Gas Exhibitions.—Under the auspices of the Corporation Gas Department, an interesting exhibition of gas appliances was opened on the 15th inst., at Rochdale, by Messrs. John Wright and Co., Limited, of Birmingham and London, and continued until the 19th. Cookery lectures were delivered twice daily by Mrs. H. M. Young, of Warrington. The same firm held a successful exhibition at Barmouth from the 22nd to the 25th inst., when Mrs. J. Marshall gave lectures and cookery demonstrations. Messrs. Richmond and Co., Limited, of Warrington and London, held exhibitions last week at Richmond (Surrey), Llandudno, and Widnes. Mrs. Bennett lectured at the first-named town; Miss Owen, at Llandudno. At Widnes, Mr. E. W. T. Richmond delivered an address on "Gas as a Domestic Servant."

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 571.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	15 Oct.	10½	Alliance & Dublin 10 p. c.	10	16–17	..	6 3 6
100,000	10	,,	7½	Do. 7 p. c	10	11⅛–12½	..	6 0 0
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	105–107	..	4 13 5
100,000	20	27 Nov.	8	Bahia, Limited	20	12–14	..	11 8 1
200,000	5	12 Nov.	7½	Bombay, Limited	5	6⅛–6⅜	..	5 11 6
40,000	5	,,	7½	Do. New	4	4⅜–5⅜	..	5 14 1
380,000	Stck.	26 Feb.	12½	Brentford Consolidated	100	205–215	..	5 14 1
150,000	,,	,,	9⅜	Do. New	100	155–160	+2	5 15 8
220,000	20	11 Mar.	11½	Brighton & Hove Original	20	39–41*	..	5 12 2
888,500	Stck.	11 Mar.	5	Bristol	100	95–100*	..	5 0 0
320,000	20	15 Oct.	11½	British	20	43–45	..	5 0 0
50,000	10	26 Feb.	11½	Bromley, Ordinary 10 p. c.	10	19–20	..	5 15 0
51,510	10	,,	8½	Do. 7 p. c.	10	14–15	..	5 13 4
328,750	10	—	—	Buenos Ayres (New) Limited	10	6–7	..	—
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	93–96	..	6 5 0
150,000	20	26 Feb.	8	Cagliari, Limited	20	24–26	..	6 3 1
550,000	Stck.	15 Oct.	13a	Commercial, Old Stock	100	244–249	..	5 4 5
165,000	,,	,,	10a	Do. New do.	100	190–195	..	5 2 7
130,000	,,	30 Dec.	4½	Do. 4½ p. c. Deb. do.	100	118–123	..	3 13 2
800,000	Stck.	30 Dec.	13	Continental Union, Limited	100	221–226	..	5 15 1
200,000	,,	,,	10	Do. 7 p. c. Pref	100	185–195	..	5 2 7
75,000	Stck.	16 Sept.	10	Crystal Palace District	100	190–200	..	5 0 0
486,090	10	29 Jan.	10	European, Limited	10	19–20	..	5 0 0
354,060	10	,,	10	Do. Partly paid	7½	14–15	..	5 0 0
5,470,820	Stck.	12 Feb.	12	Gaslight & Coke, A, Ordinary	100	212–217	+1	5 10 7
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	94–97	..	4 2 5
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	244–249	..	4 0 4
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	116–121	..	4 2 9
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	169–174	..	4 6 2
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	150–154	..	4 10 11
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	241–246	..	4 1 3
476,000	,,	,,	—	Do. K, 6 p. c. Prf.	100	145–150	..	4 0 0
1,061,150	,,	11 Dec.	4	Do. 4 p. c. Deb. Stk.	100	113–116	..	3 9 0
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	118–123	..	3 13 2
908,000	,,	,,	6	Do. 6 p. c. do	100	163–168	..	3 11 5
3,800,000	Stck.	12 Nov.	12	Imperial Continental	100	222–226	+1	5 6 2
75,000	5	26 June	6	Malta & Mediterranean, Ltd.	5	4–4½	..	6 13 4
560,000	100	1 Oct.	5	Met. of Melbourne, 5 p. c. Deb.	100	108–110	..	4 10 11
541,920	20	27 Nov.	6⅔	Monte Video, Limited	20	14⅜–15⅜	..	8 7 8
150,000	5	27 Nov.	10	Oriental, Limited	5	8⅛–8⅜	..	5 14 3
60,000	5	30 Sept.	7	Ottoman, Limited	5	4–5	..	7 0 0
166,870	10	26 Feb.	2	Pará Limited	10	2⅜–3⅛	..	—
420,000	100	3 Nov.	6	People's Gas of Chicago— 1st Mtg. Bds.	100	100–105	..	5 14 3
500,000	100	1 Dec.	6	2nd Do.	100	100–105	..	5 14 3
150,000	10	15 Oct.	10	San Paulo, Limited	10	9–10	..	10 0 0
500,000	Stck.	26 Feb.	15½	South Metropolitan, A Stock	100	266–271	..	5 14 3
1,350,000	,,	,,	12	Do. B do.	100	220–225	..	5 6 8
200,000	,,	,,	13	Do. C do.	100	235–240	+3	5 8 4
725,000	,,	30 Dec.	5	Do. 5 p. c. Deb. Stk.	100	138–143	..	3 10 0
600,000	Stck.	11 Mar.	11½	Tottenham & Edm'nton, Orig.	100	—	..	—
				WATER COMPANIES.				
729,331	Stck.	30 Dec.	10	Chelsea, Ordinary	100	225–235	−5	4 5 1
1,720,560	Stck.	15 Oct.	8	East London, Ordinary	100	192–197	−½	4 1 3
544,440	,,	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	136–140	..	3 4 3
700,000	50	11 Dec.	8	Grand Junction	50	92–96	+1½	4 3 4
708,000	Stck.	12 Feb.	10½	Kent	100	240–250	−10	4 4 0
1,043,800	100	30 Dec.	9½	Lambeth, 10 p. c. max.	100	205–215	−2½	4 8 4
406,200	100	,,	7½	Do. 7½ p. c. max.	100	185–190	..	3 19 0
260,000	Stck.	30 Sept.	4	Do. 4 p. c. Deb. Stk.	100	120–123	..	3 5 0
500,000	100	12 Feb.	12½	New River, New Shares	100	325–335	..	3 22 4
1,000,000	Stck.	29 Jan.	4	Do. 4 p. c. Deb. Stk	100	125–128	..	3 2 6
902,300	Stck.	30 Dec.	6½	S'thwk & V'xhall, 10 p. c. max.	100	132–137	−3	4 15 0
126,500	100	,,	6½	Do. D 7½ p. c. do.	100	140–145	..	4 9 8
1,155,066	Stck.	11 Dec.	10	West Middlesex	100	236–241	−1½	4 3 0

*Ex div.

a Next dividends will be at this rate.

Completion of New Water-Works for Padiham.—The new water-works of the Padiham Local Board, at Churn Clough, were formally opened last Wednesday by Mr. E. Ingham, Chairman of the Board. They were commenced in November, 1884; and the total cost is estimated at £70,000.

Water Affairs at Loughborough.—The General Purposes Committee of the Loughborough Town Council, at their meeting yesterday week, decided to accept a tender submitted by Messrs. Oakes and Co., amounting to £1739, for laying a 12-inch auxiliary water-main from Nanpanton, and one from Mr. J. Band, of Peterborough, for executing certain work in connection with the new main for £700. At the same meeting, a statement was presented by the Town Clerk from which it appeared that, after crediting the water-supply account with the sum of £500 per annum for water used for public purposes, there was still a difference of £1136 between the receipts and expenditure; and this had to be provided out of the general district rate. The deficit was occasioned by the water charges being so much under the scale authorized by the Act, and below the charges for water made in other towns. After a protracted discussion, the Finance Committee were instructed to prepare, and submit to the Council for approval, a scale of charges which would cover the cost of supply.

The Acquisition of the Calverley District Water Company by Local Authorities.—A letter was read at the meeting of the Farsley Local Board yesterday week from the Secretary of the Calverley District Water Company, asking if the Pudsey, Farsley, and Calverley Local Authorities intended taking over the concern on the 1st prox., it being absolutely essential for the Directors to know as early as possible in order to make arrangements for the collection of the book debts; and further if it was the desire of the respective Boards that the Directors should carry on the undertaking for another period. The Directors, the letter stated, deemed it necessary to have this information at once, so as to purchase stock and material to keep the plant in an efficient condition. It was pointed out, on the reading of the letter, that the Board had not yet received the sanction of the Local Government Board to the borrowing of the necessary money. It was therefore resolved that the Clerk should write to them pointing out that there was an arrangement to take over the works on the 1st prox., and ask for a reply saying if they would grant the necessary sanction.

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM LONDON." **GWYNNE & CO.,** TELEPHONE No. 2698.

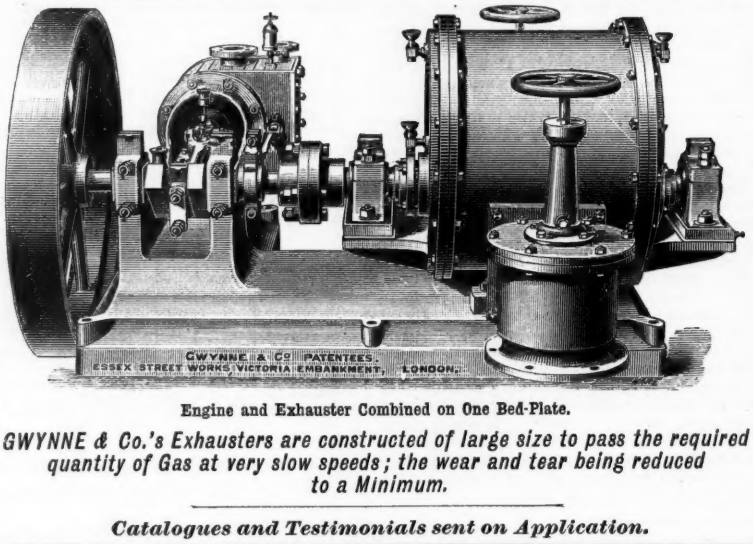
HYDRAULIC AND GAS ENGINEERS, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C.

Thirty-three Medals at all the Great International Exhibitions have been awarded to GWYNNE & Co., for Gas Exhausters, &c.

They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality.

The result is that in every instance their work is giving the fullest satisfaction.

They have completed Exhausters to the extent of 30,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work, and an be referred to.



Engine and Exhauster Combined on One Bed-Plate.

GWYNNE & Co.'s Exhausters are constructed of large size to pass the required quantity of Gas at very slow speeds; the wear and tear being reduced to a Minimum.

Catalogues and Testimonials sent on Application.

Their Exhausters can be made, when desired, on their New Patent Principle, to pass Gas without the slightest oscillation or variation in pressure.

NO OTHER MAKER CAN DO THIS.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, STEAM-PUMPS for Tar, Liquor, or Water; PATENT SELF SEALING AND CLEANSING RETORT-LIDS AND MOUTHPIECES; CENTRIFUGAL PUMPS and PUMPING ENGINES specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH-SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

ANDREW STEPHENSON, Agent.
Please address all communications to the Company, as above.

ANDREW STEPHENSON, Agent for BRIN'S OXYGEN COMPANY, Limited, Westminster, S.W.
City Address: 182, Gresham House, Old Broad Street, LONDON, E.C.

WINKELMANN'S "Volcanic" Fire CEMENT. (Fire resistance, 4500° Fahr.)
Prices, particulars, and directions for use on application to ANDREW STEPHENSON, 182, Gresham House, Old Broad Street, LONDON, E.C.

CANNEL COAL, ETC.

JOHN ROMANS & SON, EDINBURGH.
Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEAR DALKEITH, } SCOTLAND.

OXIDE OF IRON FOR GAS PURIFICATION.

JAMES GORDON & Co., Brokers, can offer Cargoes of good quality; also 300 tons of SPENT OXIDE.
Samples and price on application.
Address Borough Buildings, 7, Rumford Street, LIVERPOOL.

JAMES LAWRIE & CO. supply Best SCOTCH CANNEL COALS, Best FIRE-CLAY RETORTS, BRICKS, TILES, and LUMPS; BOILER SEATING BLOCKS, FLUE COVERS, and SILICA BRICKS for SPECIAL FURNACE WORK; COKE BARROWS, BOGIES, and SMALL WAGONS.
Postal Address: 1, WHITTINGTON AVENUE, E.C.
Telegram Address: "EIRWAL LONDON."

W. C. HOLMES & Co., Huddersfield, AND 80, CANNON STREET, LONDON, Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 564 of this week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock, Oldham."

TUBES.

FOR Gas, Steam, and Water; Galvanized, White Enamelled, and Hydraulic Tubes, &c.
JOHN SPENCER, Globe Tube Works, WEDNESBURY, and 14, Great St. Thomas Apostle, LONDON.

HUTCHINSON BROTHERS, Barnsley, Gas Engineers and Contractors, Makers of Wet and Dry Gas-Meters and General Gas Apparatus, Sulphate of Ammonia Plant, Lead Saturators, Tanks, &c., Tools and Sundries.

JOHN RILEY & SONS, Chemical Manu- facturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application. OXIDE PAINT, SULPHURIC ACID, & Chemicals. 120 and 121, NEWGATE STREET, LONDON, E.C.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

OIL for the "Wells" or "Lucigen" Lamps.
HARDMAN AND Co., Miles Platting, MANCHESTER.

COZE'S Automatic Apparatus for CHARGING AND DISCHARGING GAS-RETORTS. For Illustrated Advertisement of this System, see p. III., centre of JOURNAL.
Inquiries should be addressed to THE AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED, 86-88A, LEADENHALL STREET, E.C.

DRAWINGS, Tracings, Specifications, Quantities, &c., prepared by an experienced Engineering Draughtsman. Plans of Works made, copied, or enlarged. Blue copies made. Illuminated Addresses in first-class style. Writings of all kinds, Engrossments, &c.
Address J. L. FEATHERSTONE, 173, Fentiman Road, LONDON, S.W.

FRIEDRICH LUX, Ludwigshafen am Rhein; and at No. 142, Great Portland Street, London, W.
LUX's Gas Regulators for every consumption.
LUX's single-stem Pressure-Gauges.
LUX's Regulator for Gas-Engines.
LUX's Gas-Balance.
LUX's new Gas Regulator for Inverted Lamps and other Apparatus for Gas Lighting, &c.

SADLER AND CO., LIMITED, MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 70, Wellington Street, GLASGOW; 58, Fountain Street, MANCHESTER; and 85, Water Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office: MIDDLESBROUGH. Correspondence invited.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors, for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings, at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER, LINCOLN."

MR. J. C. CHAPMAN, Fellow of the Chartered Institute of Patent Agents, advises on all matters connected with LETTERS PATENT FOR INVENTIONS and the PROTECTION OF TRADE MARKS, &c., at home and abroad. Preliminary Information and Handbook on application.
70, Chancery Lane, LONDON, W.C.

LIQUOR and Tar wanted. BROTHERTON AND CO., Ammonia and Tar Distillers, LEEDS and WAKEFIELD.

MODELS for Lighting Appliances manufactured to order in any style.
Address MORITZ WEIDLICH, Holbmannstr, 16, BERLIN, S.W.

LIQUID FUEL.

TAR Oils, Naphthalene, Oil Residues, Tar, Petroleum, &c. SADLER'S PATENT BURNER is the simplest and most effective. No smoke; no Ashes
For particulars and price of Burner and Cheap Oils, apply to SADLER AND CO., LIMITED, MIDDLESBROUGH.

IRISH BOG ORE OXIDE OF IRON.

ONE Thousand tons of guaranteed quality, shipped direct from Ireland to any port in quantities to suit purchaser during the year.
Address No. 2086, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SUBSCRIBERS to the Masonic Charities are reminded of the case of the Son of the late Bro. FRANK HENRY HARRIS; and are asked to kindly RESERVE THEIR VOTES for this Candidate. The case was referred to in the JOURNAL OF GAS LIGHTING for the 16th ult. (p. 293); and proxies may be sent to Bro. J. ELY, Gas-Works, ABINGDON, or to the Office of the JOURNAL, when they will be duly acknowledged.

THE Advertiser may be consulted upon the MANAGEMENT and CONSTRUCTION of SMALL GAS-WORKS, and is open to undertake the General Supervision and Management of the same. He has had over 20 years' practical experience in the Manufacture of Gas and the Management of Gas-Works.
Address JOHN HENRY LYON, Superintendent and Secretary, Gas-Works, MALVERN LINK.
LYON'S COMBINATION SYPHON AND TEST BOXES. Mr. L. will thank his patrons and others to address all communications as above.

ADVERTISER (age 21) seeks a Situation as ASSISTANT CLERK or METER INDICER in a Gas Company's Office. Has had Four years' experience in present Situation. Moderate Salary.
Address W.W., Gas-Works, DORCHESTER.

ADVERTISER requires an engagement as WORKING MANAGER in Gas-Works, Public or Private. Can take entire charge. Married, no family. Good references.
Address No. 2081, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

A GENTLEMAN, 25 years in the office of a London Gas Company, desires an appointment—temporary or permanent—as SECRETARY, ASSISTANT SECRETARY, or other Capacity where his experience would be of value.
Address No. 2084, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, an engagement as Sub- MANAGER in a Tar-Works, by a Young Man, who has served his apprenticeship to the Trade. Good references as to character and ability.
Apply, by letter, to No. 2083, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS COMPANIES.

WANTED, an engagement to assist in the erection of simple PLANT for the Manufacture of SULPHATE of AMMONIA and SULPHURIC ACID, and to work the same. Experience 27 years.
Address S. J. GOWERS, 4, Crosby Road, Romford Road, Stratford, LONDON, E.

WANTED, a Position as Assistant ENGINEER or CLERK OF WORKS in Gas-Works at home or abroad. Experience covers Contracting Engineer's Works four years, Superintending Gas-Works Extensions (now completing) three years. Efficient Draughtsman, and Quantities Clerk. Age 26.
Address No. 2088, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ISSUE OF STOCKS AND SHARES BY AUCTION UNDER PARLIAMENTARY POWERS.

MR. ALFRED RICHARDS undertakes the issuing by Auction of GAS AND WATER SHARES under Parliamentary Powers.
He also holds MONTHLY SALES of GAS AND WATER SHARES at the Auction Mart, Tokenhouse Yard, E.C.
The next Sale will consist of several hundred Shares in the following Companies:—
Crystal Palace District Gas Company.
West Ham Gas Company.
North Middlesex Gas Company.
Woking Water Company.
Romford Gas Company.
West Kent Gas Company.
Ilford Gaslight and Coke Company.
Waltham Abbey and Cheshunt Gas and Coke Company.
Harrow District Gas Company.
Terms for including Shares in these Sales, and all particulars relating thereto, may be had of Mr. ALFRED RICHARDS. Offices: 18, FINSBURY CIRCUS, E.C.

WANTED, a Draughtsman, tempo- rarily (not for Machinery).
Address No. 2087, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for Naphtha and Benzol Rectifying, a first-class Working Man. Must be well up in the business, and capable of managing a small Works.
State where last employed and wages required to No. 2085, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Ennis Gas Consumers' Company require the Services of a Man as ENGINEER and GAS-FITTER. Must be a good Carbonizer, layer of Mains and Services, and understand repairing of Meters. Salary, 30s. per week, with House, Fuel, and Light free.
Send testimonials with application to the SECRETARY, Gas-Works, Ennis, Co. CLARE.

CAISTOR GAS AND COKE COMPANY, LIMITED.

THE Directors of the Caistor Gas and Coke Company, Limited (making over 2 million cubic feet of Gas per annum), require the services of a WORKING MANAGER, to be entrusted with the entire charge of the Works, to keep the Yard-Books, and take Indices of Meters. He must also have a practical knowledge of Interior Fittings, &c.
Applications, stating age, experience, and salary required, with testimonials as to character and fitness, to be addressed to me, in applicant's own handwriting, on or before the 6th day of April next.
No one need apply who is not fully competent to undertake the duties of the situation, and who is not a thoroughly sober and attentive man of business.
F. B. COUSANS,
Secretary.
Caistor, Lincolnshire,
March 19, 1892.

EXHAUSTER.

WANTED, a good Second-hand EXHAUSTER, about 20,000 cubic feet per hour, complete with Valves and Compensator.
Address, stating Maker's Name and other particulars, with Price at nearest Railway Station, to P. INNES, 11, Bothwell Street, GLASGOW.

GAS-METERS FOR SALE.

THE Royal Agricultural Hall Company, Limited, Islington, have FOR SALE one 500-LIGHT DRY METER, and one 200-LIGHT DRY METER, which until recently have been used at the Hall, and are in good working order.
Apply to R. VENNER, Secretary, Royal Agricultural Hall Company, Limited, ISLINGTON.

PETERBOROUGH GAS COMPANY.

A TELESCOPIC Gasholder for Sale— Outer Lift, 50 ft. diameter by 18 ft. deep; Inner Lift, 49 ft. 2 in. diameter by 18 ft. deep; Eight Cast-Iron Columns and Wrought-Iron Girders. The same to be removed from the Works by April 30, 1892.
The Directors invite TENDERS for the above, to be addressed to the Chairman of the Company, and delivered not later than April 11, 1892.
J. BARTON,
Secretary and Manager.
March 19, 1892.

THE GLASGOW ALUM AND AMMONIA COMPANY, LIMITED, IN LIQUIDATION.

TO BE SOLD by Public Roup, within the Faculty Hall, St. George's Place, Glasgow, on Wednesday, April 13, 1892, at 2.30 in the afternoon (unless previously disposed of), the WORKS OF THE ABOVE COMPANY, in West Street, Tradeston, Glasgow, immediately adjoining the Tradeston Gas-Works.
The Ground measures 5425 square yards; and from its situation, and having a Railway Siding, it is valuable as a Site for any kind of Works; but, for its present use, it is specially suitable, as the Residual Products of the Gas-Works are conveyed therefrom by Connecting-Pipes. The Buildings and Plant, which are extensive and substantial, and suitable for the business, include Ammonia Plant, Tar Plant, Pitch Oil Store-Tank, Naphtha Plant, &c.
Feu Duty, &c., £107 14s. 5d.
The Works are in full operation; but, in order to ensure a sale, the whole Property will be exposed at the upset price of £90.0, which is about the value of the Ground apart from the Buildings.
For particulars apply to THOMSON M'LINTOCK, C.A., 88, St. Vincent Street, or J. M. TAYLOR AND FOULIS, Writers, 180, St. Vincent Street, GLASGOW.

MESSRS. DEBENHAM, TEWSON, FARMER, and BRIDGEWATER'S MONTHLY LIST of Shops, Show-Rooms, Factories, and Waterside Premises, suitable for the Exhibition and Manufacture of Engineering and other Appliances, may be obtained, free of charge, at their Offices, 80, CHEAPSIDE, E.C.

FOR SALE—A 7000 Cubic Feet per hour BEALE'S EXHAUSTER, in good condition.
Apply to the MANAGER, Gas Company, DORKING.

NEWTOWNARDS TOWN COMMISSIONERS (NEAR BELFAST).

FOR SALE—A Set of Four Dry LIME PURIFIERS, 6 feet square by 3 feet deep, with 8-inch Hydraulic Centre-Valve and Connections, having Cover and Valve, and Lifting Apparatus on top of Centre-Valve.
Prices to Wm. Heron, Esq., Town Clerk.
Particulars from ALEXR. WADDELL, Manager.

RAMSGATE CORPORATION.
(GAS AND WATER DEPARTMENT.)

THE Gas and Water Committee invite TENDERS for the work necessary to be done in CONVERTING four 14 feet square PURIFIERS into two 33ft. 3in. by 14 feet, or thereabouts, with Covers complete.
Tenders to be sent in at or before Noon on Monday, April 11, addressed to the Chairman of the Gas and Water Accounts Committee, Gas-Works, Hardres Street, Ramsgate, endorsed "Tender for Alteration to Purifiers."
The Committee do not bind themselves to accept the lowest or any tender.
Specification and full particulars on application to
WILLIAM A. VALON,
Engineer.

BOROUGH OF DEWSBURY.

SCRUBBER-WASHER.

THE Corporation hereby invite Tenders for the Supply, Construction, and Erection complete of a new SCRUBBER-WASHER (equal to dealing with a maximum daily production of 2,000,000 cubic feet of Gas) at their Savile Gas-Works, Dewsbury.
Further Particulars and Forms of Tender may be obtained from Mr. Chas. A. Craven, Engineer and Manager of the Works.
The Corporation do not bind themselves to accept the lowest or any tender.
No allowance for estimates.
Sealed tenders, endorsed "Tender for Washer-Scrubber," to be sent to the undersigned, not later than Three p.m. on Monday, the 4th day of April, 1892.
E. MAWDESLEY,
Town Clerk.
Town Clerk's Office,
Town Hall, Dewsbury.

LEEDS CORPORATION.
(GAS DEPARTMENT).

TENDERS are required as below:—
For Turned and Bored and other Pipes, Bends, Tees, Syphon Wells, and other Irregular Pipes.
For Brass Main Cocks.
For 2½, 3, and 4 inch Self-faced Bradford or Halifax Flags.
For Craven or Derbyshire Lime.
For Retort Mouthpieces, Stand-Pipes, Door-Frames, Special Bends, Tees, Flange Pipes, &c.
For Wrought-Iron Tubes.
Samples may be seen on application at the Stores Department, 21, Dewsbury Road; and Forms of Tender and Specification may be had on application to Mr. Lupton, at the Offices of the Gas Department, Municipal Buildings.
Sample bundles of Tubes to be sent as directed on form of tender.
Endorsed tenders, addressed to the Chairman, will be received not later than Wednesday, the 20th of April next; and no tender will be considered except on the form provided.
The lowest or any tender will not necessarily be accepted.

COUNTY BOROUGH OF BURNLEY.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee of the Corporation of Burnley are prepared to receive TENDERS for One, Two, or Three years, from the 1st of July next, for the supply of 3000 tons per annum of CANNEL COAL, to be delivered in such monthly quantities as the Gas Manager of the Corporation may from time to time require.
The Coals must be of good quality, dry; and as free as possible from Sulphur, Bats, Bind, Refuse, and Dirt; and must be delivered into the Wagons of the Corporation at their Wharf on the Leeds and Liverpool Canal, adjoining the Gas-Works.
Any person or persons tendering may be required to send samples of the Coals offered, at the quoted price, before the contract is let.
Tenders must be made upon a form to be obtained on application to me.
They must be sealed, and specify fully the description of the Coals and the Pits at which they are to be raised, and must be addressed to the Chairman of the Gas Committee, Town Clerk's Office, Burnley, endorsed "Tender for Cannel," and posted not later than Wednesday, the 30th of March, 1892.
By order,
ROBERT E. FOX,
Town Clerk.
Town Hall, Burnley,
March 11, 1892.

THE Directors of the Tewkesbury Gas Company, Limited, are prepared to receive TENDERS for the supply and erection of a SINGLE-LIFT GASHOLDER, 69 feet diameter by 20 feet deep; also for the construction of a GASHOLDER TANK in Brick, 72 feet diameter, Stand Well, &c.

Drawings and Specifications may be seen on application at the Gas-Works, Tewkesbury.

Sealed tenders, endorsed, to be sent to John Price, Esq., Chairman, on or before Monday, April 4, 1892.

The Directors do not bind themselves to accept the owest or any tender.

By order,
JOHN SURL,
March 14, 1892. Manager, &c.

BOROUGH OF MOSSLEY.

OXIDE.

THE Gas Committee are prepared to receive OFFERS for about 160 tons of SPENT OXIDE, in good condition.

Samples can be had on application to the undersigned.

They are also prepared to receive TENDERS for the supply of 80 tons of NEW OXIDE, either by Boat or Railway Station.

Tenders (endorsed) to be sent to the Town Clerk not later than April 9.

RICHARD MERRELL,
Manager.
Gas-Works, Mossley,
March 23, 1892.

BRIGHOUSE LOCAL BOARD.

TO GASHOLDER MAKERS.

THE Brighouse Local Board invite TENDERS for the Excavator's, Concretor's, and Engineer's Work required in the erection and completion of a WROUGHT-IRON ANNULAR TANK and THREE-LIFT TELESCOPE GASHOLDER, 120 feet diameter by 25 feet deep, at their Gas-Works, Brighouse.

Plans and Specification may be seen, and Bill of Quantities obtained, upon application to the undersigned.

Sealed tenders are to be sent in, addressed to Frederick Laxton, Esq., Chairman of the Local Board, Public Offices, Brighouse, endorsed on the outside "Tender for Gasholder and Tank," and are to be delivered on or before Tuesday, the 5th day of April, 1892.

The Local Board do not bind themselves to accept the lowest or any tender.

JAMES PARKINSON,
Engineer and Manager.
Public Offices, Brighouse,
March 12, 1892.

BOROUGH OF BURTON-UPON-TRENT.

SERVICE TAR AND LIQUOR TANK.
CONTRACT No. 12.

THE Mayor, Aldermen, and Burgesses of the Borough of Burton-upon-Trent, acting by the Council, invite TENDERS from competent persons for the Supply, Construction, and Fixing of a new CAST-IRON SERVICE TAR and AMMONIACAL LIQUOR TANK, with Pump, Pipes, Valves, and other Works incidental thereto.

Full Particulars and Copies of Conditions, Specification, and Bill of Quantities, with Form of Tender, may be obtained, and the Drawings viewed, on payment of One pound (which will be returned on receipt of a *bonâ fide* tender), on application to the Gas Engineer, Mr. F. L. Ramsden, Gas-Works, Burton-upon-Trent.

Sealed tenders, endorsed "Service Tar and Liquor Tank," are to be delivered to me at or before Ten a.m., on Thursday, the 31st day of March inst.

The Council do not bind themselves to accept the lowest or any tender, nor will they pay any expense or charge relating to the making or delivery of the same.

T. N. WHITEHEAD,
Town Clerk.
Burton-on-Trent.
March 15, 1892.

Sale of 584 Gas and Water Shares in the following Undertakings:—

Crystal Palace District Gas Company,
West Ham Gas Company,
North Middlesex Gas Company,
Woking Water Company,
Romford Gas Company,
Waltham Abbey and Cheshunt Gas Company,
Harrow District Gas Company.
West Kent Gas Company,
Ilford Gaslight and Coke Company.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Tuesday, April 5, at One precisely, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

WEST HAM GAS COMPANY.

SALE OF 1150 SHARES.

MR. ALFRED RICHARDS is favoured with instructions from the Directors TO SELL BY AUCTION, at the Mart, E.C., on Thursday, April 21, at Two o'clock precisely, in Lots of ten Shares each, 1150 £10 SHARES in the West Ham Gas Company.

The Standard Dividend authorized by the Company's Act of Parliament is 7 per cent., subject to the usual Sliding Scale Clauses.

Particulars may be obtained at the MART; of the SECRETARY to the Company, STRATFORD, E.; of Messrs. HILLEARY, Solicitors, 5, FENCHURCH BUILDINGS, E.C.; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

RICHMOND, SURREY.

IMPORTANT SALE OF GAS STOCK UNDER THE RICHMOND GAS ACT, 1881.

MR. B. WOOD has been favoured with instructions from the Directors of the Richmond Gas Company TO SELL BY AUCTION, at the Greyhound Hotel, Richmond, Surrey, on Thursday, April 7, 1892, in lots, £4000 ORDINARY "C" STOCK in the Richmond Gas Company, bearing a Maximum Dividend of 7 per cent. per Annum, and which has been paid since the Stock was first issued, now many years past.

Particulars and Conditions of Sale may be obtained at the OFFICES of the Company, RICHMOND GREEN; of Messrs. SMITH AND BURRELL, Solicitors, Hill Street, RICHMOND; at the GREYHOUND HOTEL, RICHMOND; and at the AUCTIONEER'S OFFICES, 42, George Street, RICHMOND.

ALBO-CARBON LIGHT COMPANY, LIMITED.

FOR SALE
(To Close a Trust Estate)

TEN Shares of £50 each (£30 paid) of the above Company. Dividend for last Three years, 7½ per cent.

Apply to WEBSTER, WILL, AND RITCHIE, 37, Queen Street, EDINBURGH.

MEIKLEJOHN'S PATENT

Improved Slide-Valve Anti-Dip.

Is perfectly reliable in action, and requires no attention. Has all the advantages of the Dip and Anti-Dip combined.

Is cheap and easily fixed to any form of main.

Will be found the most efficient appliance of the kind yet introduced.

Further particulars and price from

C. MEIKLEJOHN,
OLDBURY, BIRMINGHAM.
(Late N. MEIKLEJOHN, Longwood.)

MESSRS. Wheatley and Mackenzie beg to say that they have acquired the business of the late **W. H. BENNETT**, Esq., and that having a special experience in matters connected with Gas, Water, and Sanitary Improvement, will continue to give the same assistance to Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, or LETTERS PATENT.

Patents completed or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to WHEATLEY AND MACKENZIE, 40, Chancery Lane, LONDON, W.C.

WILLIAM HENRY BENNETT, DECEASED.

PURSUANT to the Act of Parliament, 22 & 23 Vic., Cap. 35, all Creditors and others having any Claims against the ESTATE of WILLIAM HENRY BENNETT, late of 54, Chelsham Road, Clapham, Surrey, and 22, Great George Street, Westminster, Middlesex, Consulting Engineer, who died on the 7th of February last, and whose Will was proved in the Principal Registry of the Probate Division of the High Court of Justice, on the 10th day of March, 1892, by us the undersigned, the Executors therein named, are hereby required to send PARTICULARS in writing of the DEBTS, CLAIMS, or DEMANDS to us, at No. 315, Edgware Road, London, W., on or before the 18th of April, 1892, after which date we shall proceed to distribute the Assets of the said Deceased amongst the persons entitled thereto, having regard only to the Debts, Claims, and Demands of which we shall then have had notice.

Dated this 18th day of March, 1892.

FRANK W. BENNETT.
C. V. BENNETT.
315, Edgware Road, London, W.

L. MONK & CO.,
Cannel and Gas Coal Merchants,
34, ST. ANDREW SQUARE,
EDINBURGH.

THE CHEMISTRY OF

ILLUMINATING GAS,

By

NORTON H. HUMPHRYS, Assoc. M. Inst. C.E., F.R.S.

This work contains chapters on: The Relative Cost of Light from Gas, Oil, and Candles; Products of Combustion; The Sulphur Question; The Composition of Illuminating Gas; Water Gas; Various Gas-Making Processes; Oil Gas; Properties of Fluid Hydrocarbons; Tar for Gas-Making; Destructive Distillation; Condensation; and Purification.

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

C. & W. WALKER'S
GASHOLDERS; PURIFIERS;
PURIFYING MACHINES;

CO_2 AND TAR-EXTRACTING WASHERS; SCRUBBERS;

SULPHATE & SULPHUR PLANT;

PATENT SELF-SEALING RETORT MOUTHPIECES;

LIFTING APPARATUS; CENTRE AND FOUR-WAY VALVES;

SOLE MANUFACTURERS OF WECK'S PATENT CENTRE-VALVE;

PATENT TAR PLANT; CONDENSERS;

SLIDE VALVES; TAR BURNERS; &C., &C.

WOOD SIEVES.

ADDRESSES:

MIDLAND IRON-WORKS, DONNINGTON, NEAR NEWPORT, SHROPSHIRE;

10, Finsbury Square, London.

"FORTRESS DONNINGTON." "FORTRESS LONDON."—Telegraphic.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

MARKS & RUSSELL,
Cannel and Gas Coal Merchants,
53, WATERLOO STREET,
GLASGOW.

NEWBATTLE CANNEL.

QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

For **FIRE-BRICKS,** the most durable for **GAS-FURNACES,**
ADDRESS
JAMES WHITE & Co., Limited,
ALBERT WORKS, WIDNES.

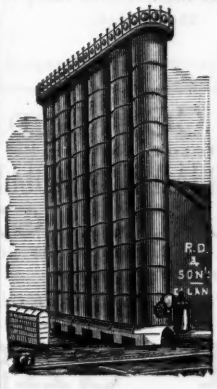
JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.

Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1¼ to 48 inches in diameter; and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas Water, Railway, Telegraph Chemical, Colliery, and other Companies.
NOTE. — Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers, and rendering leakage impossible.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97 WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on application.

DEMPSTERS'
(LIMITED.)



CONDENSERS,
CONDENSERS,
CONDENSERS.

ELLAND.

THE SILICA FIRE-BRICK COMPANY,
OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE
SILICA BLOCKS,
BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

AUG. KLÖNNE,
DORTMUND (GERMANY).
REGENERATIVE FURNACES.
Unsurpassed in
Efficiency, Economy, Durability, and Easy Working.

ROSEWELL BOGHEAD.
Yield of Gas per ton . . . 13,215 Cub. Ft.
Illuminating Power . . . 37·56 Candles.

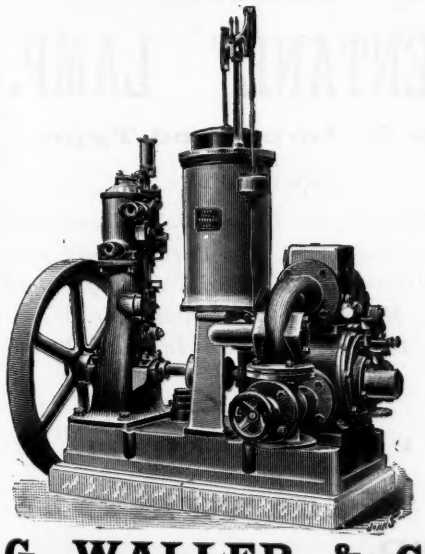
GAVIN PAUL & SONS,
CANNEL COALMASTERS,
EDINBURGH.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for
CANNEL & COAL.

TYNE BOGHEAD CANNEL.
Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.
Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 70 per cent.

For Prices and complete Analysis, apply to
YOUNG, DANCE, & CO.,
COAL OWNERS, NEWCASTLE-ON-TYNE.
Or E. FOSTER & CO., 21, John St., Adelphi, LONDON, W.C.



WALLER'S PATENT COMBINED GAS ENGINE AND EXHAUSTER
WITH
Disc-Valves, Automatic Bye-Pass Valve, Throttle-Valve, and Regulator,
COMPLETE ON ONE BASE PLATE.
Designed chiefly for sizes from 500 to 15,000 feet per hour.

EXHAUSTERS OF ANY SIZE
COMBINED WITH GAS-ENGINES (now made to vary in speed).

ENGINES & EXHAUSTERS RUN AT DIFFERENT SPEEDS.
Waller's Washer-Scrubber with Wood Clusters.
ELEVATING AND CONVEYING MACHINERY FOR COAL, COKE, &c.

ILLUSTRATED CATALOGUE ON APPLICATION.

G. WALLER & Co., Engineers, Founders, Boiler Makers,
58, PARK STREET, SOUTHWARK; & STROUD, GLOUCESTERSHIRE.

THOMAS ILLINGWORTH,

NORTH DEAN CHEMICAL WORKS

Near HALIFAX,

MANUFACTURER OF SULPHURIC ACID

OF EXTRA QUALITY FOR MAKING

WHITE SULPHATE OF AMMONIA.

TAR, LIQUOR, AND SPENT OXIDE
Purchased for Cash against Delivery.

THOMAS LIGHTING Co., LTD.,

15, CARTHUSIAN ST.,

LONDON, E.C.

Manufacturers of the "**Thomas**" Patent Lamps for general lighting, also for Public Buildings, Institutions, &c., and for outside purposes.

The best Regenerative Lamp in the Market.

Special quotations to Gas Companies.

CAST-IRON PIPES

FOR GAS AND WATER.

Pipes, One to Six inch Bore, kept in Stock. Also a very large assortment of all sizes of Bends, T-pieces, and Specials ready for despatch on receipt of Order.

VALVES

FOR GAS, WATER, AND STEAM

TELEGRAMS "PIPES GLASGOW."

WM. MACLEOD & CO.,

56, ROBERTSON STREET, GLASGOW.

JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of

ALDWARKE MAIN CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 feet of 19-candle gas per ton.
Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.
Telegrams: "ATLAS SHEFFIELD."

PREPAYMENT GAS-METER.

(PRICE'S PATENT.)

This Meter has a simple Automatic arrangement fitted, whereby, upon the insertion of a shilling, a supply of gas can be obtained, and which is cut off on the quantity paid for being consumed. The Meter gives warning when the quantity is nearly exhausted, so that another shilling may be inserted. There is, however, no occasion to wait until this happens, as a second shilling can be inserted after two-pennyworth of the first shilling has been consumed.

The Meter is fitted with the ordinary registering dial, and has in addition a circular one divided showing twelve pence. On each Meter is marked the number of cubic feet it will pass for one shilling; and this can be arranged to cover cost of Meter-Rental, Fitting, and Gas consumed. These Meters are made of the best material and workmanship.

SPECIALLY ADAPTED FOR INCREASING CONSUMPTION AMONGST SMALL CONSUMERS.
NO RISK OF BAD DEBTS.

PROPRIETORS AND MANUFACTURERS:

D. HULETT & Co., LIMITED,

GAS-METER MAKERS, 55 & 56, HIGH HOLBORN, LONDON.

THE MOST RELIABLE STANDARD OF LIGHT

IS

HARCOURT'S

STANDARD

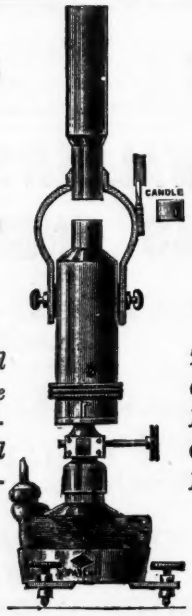
"PENTANE" LAMP.

No. 2.—Improved Type,

AS USED BY

Mr. Dibdin, Mr. Heisch, Liverpool United Gas Company, The Hague Gas-Works, The Leyden Gas-Works, Alex. Wright & Co., Stafford Corporation Gas-Works, Negretti and Zambra, Mr. Frank Livesey, Mr. Jas. Swinburne, Winfields Limited, &c., &c.

Prices, &c., from



IS

HARCOURT'S

STANDARD

"PENTANE" LAMP.

No. 2.—Improved Type,

AS USED BY

The Admiralty, the United States Government, Chinese Government, Cie. Parisienne du Gaz, Dublin University, Harvard University, Owen's College, Manchester, Lord Rosse, Mr. W. H. Preece, Imperial Technical Institute, Berlin, &c., &c.

Prices, &c., from

Woodhouse & Rawson

UNITED, LIMITED,

88, QUEEN VICTORIA STREET, LONDON, E.C.

GASHOLDERS

C. & W. WALKER

Have erected Gasholders of all dimensions, during the last 40 years, in all parts of Great Britain, and throughout the civilized world, for upwards of 500 Gas Companies and Municipalities; all of the best materials and highest class of workmanship.

They are now erecting a four-lift Holder of about 8 MILLION cubic feet, at the Beckton Gas-Works, London.

MIDLAND WORKS, DONNINGTON, NEAR NEWPORT, SHROPSHIRE;

AND

10, Finsbury Square, London, E.C.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

MIRFIELD, NORMANTON.

Lanemark Coal Co.,

LIMITED.

LANEMARK CANNEL

AND GAS COALS.

Quotations and Analysis on application to

LANEMARK COLLIERY,

NEW CUMNOCK, N.B.

Shipping Ports: All the principal Scotch Ports.

HOLMSIDE GAS COALS.

(Wrought out of Holmside and South Moor Collieries.)

PRESENT production nearly 3000 tons per working day. Area of coal about 5000 acres, including the largest remaining workable proportion of pure HUTTON SEAM GAS COAL. Analysis of HOLMSIDE GAS COAL *in bulk as shipped* gives 10,500 cubic feet of Gas per ton, of an Illuminating Power of 16¼ candles. The Sulphur is about 1 per cent., and the Ash 1¾ per cent. The Coal cokes well, and leaves 69 per cent. of excellent Coke. During the year 1890, the London Gas Companies carbonized about 400,000 tons of HOLMSIDE COALS. They are used by The Gaslight and Coke Company, the South Metropolitan Gas Company, the Commercial Gas Company, the Woolwich (Government) Gas-Works, the Newcastle and Gateshead Gas Company, the European Gas Company, the Ipswich Gas Company, and by many other Gas Companies both at Home and Abroad.

MR. MARK ARCHER,

HOLMSIDE AND SOUTH MOOR OFFICES,

NEWCASTLE-ON-TYNE.

COKE BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT.)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

GEORGE WALLER & CO.,

PARK STREET, SOUTHWARK, E.C.

THOMAS TURTON

AND SONS, LIMITED,

Sheaf & Spring Works,

SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY

FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.

London Office:

90, CANNON STREET, E.C.

T. B. KITTEL, SHEFFIELD.

CONTRACTS FOR SUPPLIES OF ANY OF THE PRINCIPAL

ENGLISH & SCOTCH CANNELS.

REAL SILKSTONE GAS COAL

ANALYSIS AND PRICES ON APPLICATION

T. B. KITTEL, SHEFFIELD.

JOHN HALL & CO.,

STOURBRIDGE,

MANUFACTURERS OF FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

A STOCK OF DIFFERENT SHAPES ON HAND.

GAS AND WATER PIPES

AND

CASTINGS OF EVERY DESCRIPTION.

MANUFACTURED BY THE

CLAY CROSS COMPANY,

CHESTERFIELD.

TRADE	TELEGRAMS:	LONDON AGENTS:
C X C	"JACKSON"	BECK & Co.,
MARK.	CLAY CROSS.	130, GT. SUFFOLK ST., S.E.

GODDARD, MASSEY, & WARNER'S

IMPROVED

Sulphate of Ammonia Apparatus.

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALF, AND PRICES APPLY TO

GODDARD, MASSEY, & WARNER,

ENGINEERS,

NOTTINGHAM.

The Apparatus has been supplied to the following Firms—

BURT BOULTON, & HAYWOOD, SILVERTOWN, and ELING.
CHANCE BROTHERS, OLDBURY (Four Apparatus).
RUNCORN SOAP & ALKALI CO., Limited, RUNCORN.
NETHAM CHEMICAL CO., Limited, BRISTOL.
ANIMAL CHARCOAL CO., Limited, SHADWELL.
WM. BUTLER & CO., BRISTOL.
KEMPSON & CO., Pye Bridge.

And to the following Gas Companies and Corporations—

ILKESTON.	BURY.	CHORLEY.
WIDNES.	BRIGHOUSE.	WHITEHAVEN.
HALIFAX.	MARKET HARBRO'.	CHESTER.
ALTRINCHAM.	PRESCOT.	SOUTH SHIELDS.
DENTON.	SOWERBY BRIDGE.	LEEK.
ST. ALBANS.	LEICESTER.	IPSWICH.
DUKINFIELD.	DARWEN.	BOURNEMOUTH.
NORTHWICH.	NELSON.	SALFORD.
HUDDERSFIELD.	ORMSKIRK.	LUTON.
		HAMPTON COURT.

SPENT LIMES NO LONGER WASTE PRODUCTS.

Under G. R. HISLOP'S PATENTS

All Spent Limes are most effectually, economically, and continuously recovered, and at from one-third to one-half the cost of New Lime. The results are a surprise to all who have inspected the process, and are entirely satisfactory to all now using it. Descriptive Pamphlet and Terms from Agents as under.

— REGENERATIVE SETTINGS OF RETORTS. —

Hislop's Patent Producer and Patent Charging Appliances offer advantages which are unapproachable; while in every other detail his Settings are confidently recommended as being the most inexpensive and effective possible.

Illustrated Pamphlet and Terms on application to J. E. FISHER, Stourbridge, Agent for England and Wales; to C. M. HAMILTON, Portland Place, Hamilton, Agent for Scotland and Ireland; and for all other Countries to the Patentee,

Geo. R. HISLOP, Gas Engineer, PAISLEY, N.B.

WILLEY & Co.,

Gas Engineering Works, Commercial Road, Exeter.

MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS,

GASHOLDERS, Telescope and Single-Lift, any size. Some of the largest in the Kingdom erected by this Firm are giving the highest satisfaction.

PLANS and SPECIFICATIONS furnished for **Extensions** and **Enlargement** of existing **Works,** adapting them to the most **Improved** and **Modern Principle** of **Gas Manufacture.**

PURIFIERS, CONDENSERS, WASHERS, ENGINES and EXHAUSTERS, STATION METERS and GOVERNORS, manufactured and erected.

Makers, by permission of that eminent authority **Mr. GEORGE LIVESEY,** of his **CELEBRATED PATENT WASHER,** highly approved by all the Engineers of Works where adopted. Largely in demand.

Special reference and attention are invited to our

WET AND DRY METERS,

which have acquired a high reputation for the **excellence** of Materials and Workmanship; their **durability** and **accuracy** of **Register** guaranteed. They are used by several of the **London Gas Companies,** and over **200 Provincial Gas Companies.**

Price Lists, Specifications, and Estimates provided for any work appertaining to Gas Lighting, from the Retort-House to the Drawing-Room.

JOSEPH CLIFF & SONS,

INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.,
WORTLEY, LEEDS.

LONDON Offices & Depôts:
Baltic Wharf, Waterloo Bridge.
WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.
LIVERPOOL:
16, Lightbody Street.
LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

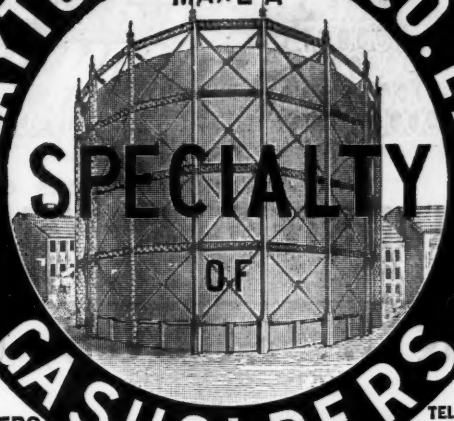
ESTABLISHED MORE THAN A QUARTER OF A CENTURY

WORKS HUNSLET. LEEDS

LONDON OFFICE: 60, QUEEN VICTORIA STREET E.C.

CLAYTON SON & CO. LTD.

MAKE A SPECIALTY OF GASHOLDERS



AND MAKERS OF GAS PLANT OF EVERY DESCRIPTION.

REG? TELEGRAPHIC ADDRESS: "GAS LEEDS"

R. & J. DEMPSTER,

Engineers, Ironfounders, and Contractors,

GAS PLANT WORKS, NEWTON HEATH, MANCHESTER

SULPHATE OF AMMONIA PLANTS,

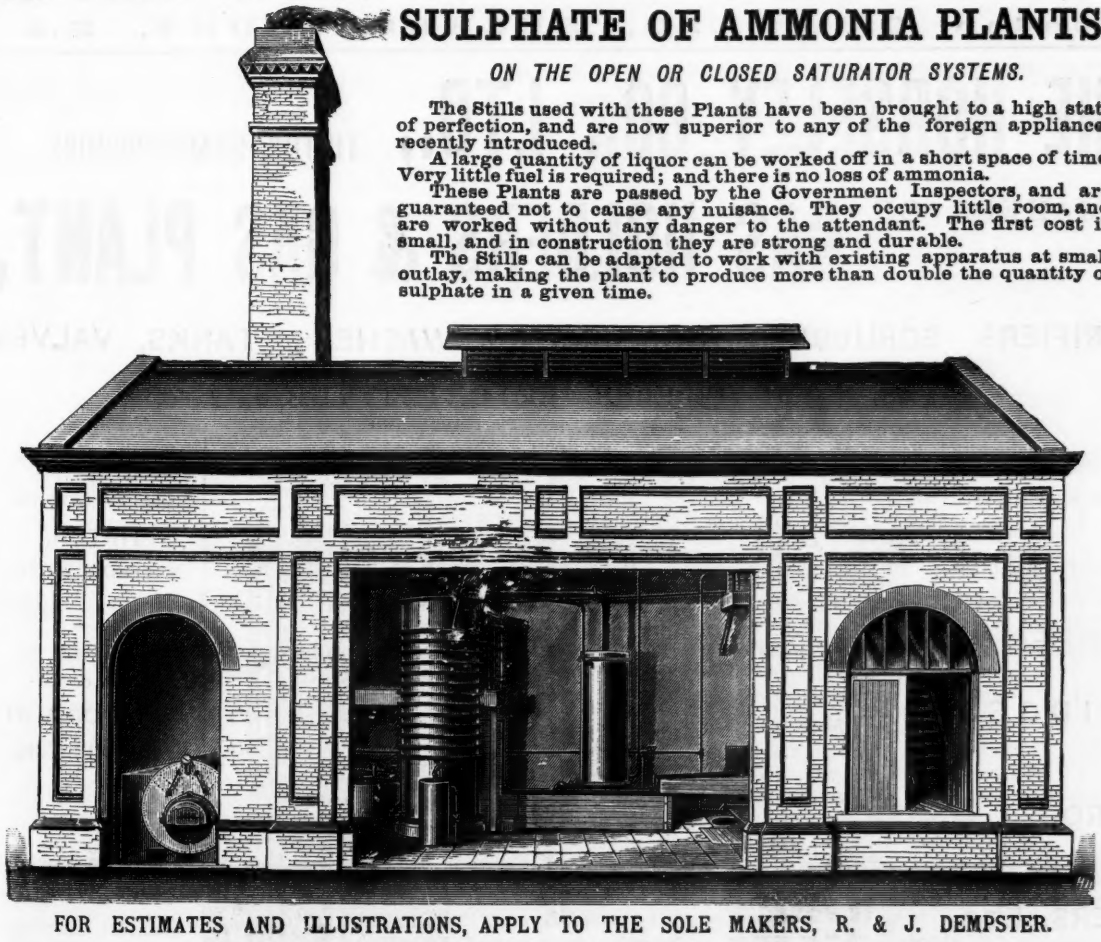
ON THE OPEN OR CLOSED SATURATOR SYSTEMS.

The Stills used with these Plants have been brought to a high state of perfection, and are now superior to any of the foreign appliances recently introduced.

A large quantity of liquor can be worked off in a short space of time. Very little fuel is required; and there is no loss of ammonia.

These Plants are passed by the Government Inspectors, and are guaranteed not to cause any nuisance. They occupy little room, and are worked without any danger to the attendant. The first cost is small, and in construction they are strong and durable.

The Stills can be adapted to work with existing apparatus at small outlay, making the plant to produce more than double the quantity of sulphate in a given time.

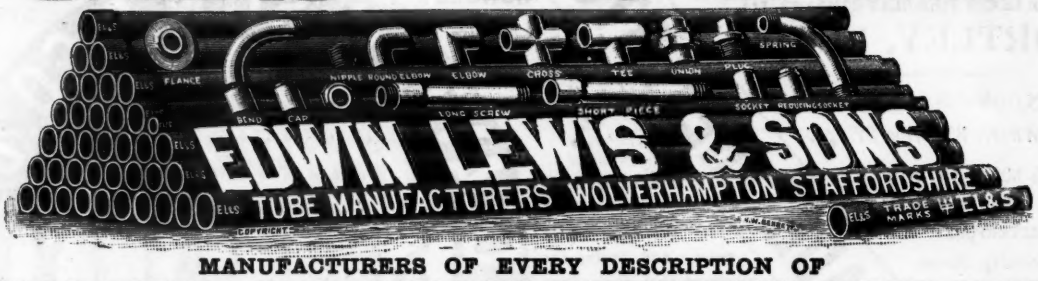


FOR ESTIMATES AND ILLUSTRATIONS, APPLY TO THE SOLE MAKERS, R. & J. DEMPSTER.

LONDON OFFICES: 181, GRESHAM HOUSE, OLD BROAD STREET, E.C.

ESTABLISHED 1825.

GAS TUBES



MANUFACTURERS OF EVERY DESCRIPTION OF

IRON OR STEEL LAP-WELDED OR BUTT-WELDED TUBES

FOR ANY PURPOSE.

J. & H. ROBUS, CONTRACTORS FOR GAS AND WATER WORKS.

Well Sinking and Boring.
Gasholders and Tanks.
Purifiers.
Main-laying.
Retorts
INCLINED
or otherwise.
Contracts taken for
Extensions of Gas-Works
Plant of all descriptions.
Retort Setters sent to all
parts of the World.
Plans, Specifications,
and Estimates
submitted.

London Offices: 20, BUCKLERSBURY, E.C.

THE HORSELEY CO., LTD., TIPTON, STAFFORDSHIRE,

MAKERS OF

GAS HOLDERS & GAS PLANT,

PURIFIERS. SCRUBBERS, CONDENSERS, WASHERS, TANKS, VALVES

PIPES, LAMP PILLARS, RETORT-FITTINGS, Etc.

ALSO ALL KINDS OF

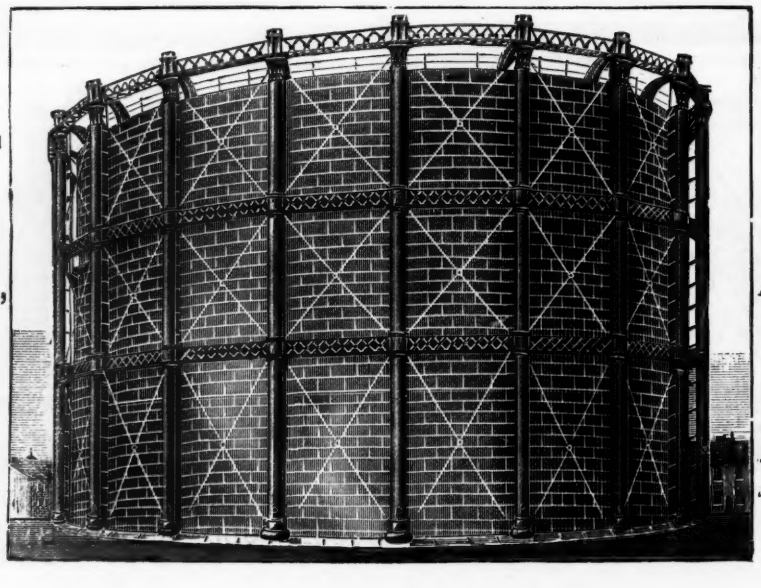
STRUCTURAL IRON

AND STEEL WORK.

BRIDGES,

ROOFS,

PIERS, Etc.



WORKS & HEAD OFFICE:
TIPTON,
STAFFORDSHIRE

LONDON OFFICE:
1, VICTORIA ST.,
WESTMINSTER.

TELEGRAPHIC ADDRESSES:
"HORSELEY, TIPTON."
"GALILEO, LONDON."

"THE METEOR."

NEW HIGH-POWER GAS-LAMP.

Westphal's Patent.

Gas Companies should hire these Lamps to their Consumers, and introduce them for Street Lighting as a rival to the Electric Light, as they do not get out of order, are most economical, and the Burner being a circular slit does not choke up.

Particulars and Prices Free.

HENRY GREENE & SONS,

SOLE CONSIGNEES FOR GREAT BRITAIN & COLONIES,
153 TO 155, CANNON STREET,
LONDON BRIDGE, E.C.

WILSON CARTER & PEARSON,

GAS COAL AND CANNEL FACTORS.

Supply to any Railway Station, or for Export, all kinds of Fuel for Gas purposes.

ADDRESS CHIEF OFFICES:

Temple Buildings, 50, New Street, Birmingham.

HENRY BALFOUR & CO.,

LEVEN, FIFE,

MAKERS OF

GASHOLDERS

And all Classes of GAS PLANT,

REVOLVING BRUSH SCRUBBERS, FOUR-WAY VALVES.

LONDON: 13, BILLITER STREET, E.C.

J. & W. HORTON

ETNA WORKS,

SMETHWICK,

NEAR BIRMINGHAM

(Established 50 Years),

PATENTEES

AND

MANUFACTURERS

OF

IMPROVED GASHOLDERS AND BOILERS

and Manufacturers of every description of

Gas Apparatus

Cast and Wrought Iron Tanks, Purifiers, Condensers, Scrubbers, Retort-Lids, Cross-Bars and Screws, Wrought-Iron Boilers for Stationary, Portable, and Marine Engines, Sugar Pans, Coolers, Clarifiers, Punts, Boats, Bridges, Girders, Roofs, Cisterns, Oil-Tanks, Melting-Pots, Crucibles, Salt-Pans, Arsl- and Range Boilers, and every description of General Ironwork.

Drawings, Specifications, and Estimate supplied.

TELEGRAPHIC ADDRESS, "GAS LEEDS."

CLAYTON, SON, & Co.

LIMITED,

LEEDS,

MAKE

RETORT LIDS

OF ALL FORMS AND SHAPES
IN IRON OR STEEL
BY SPECIAL HYDRAULIC MACHINERY.

LONDON OFFICE, 60, QUEEN VICTORIA STREET, E.C.

PRICES ON APPLICATION.

WILLIAM INGHAM & SONS,

Incorporated with the Leeds Fire-Clay Company, Ltd.,

WORTLEY FIRE-CLAY WORKS,

Near LEEDS

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

MACHINE-MADE GAS-RETORTS.

USED AT THE GAS-WORKS

AT

Ascot, Birmingham, Broadstairs, Bromsgrove, Hendon, Ilkeston, Kildwick, Knutsford, Leven, N.B., Pembroke, Seaham Harbour, Stamford, Stroud, Harwich, Uttoxeter, Wigston, &c., &c., and by Corporations and leading Engineers throughout the Country, for preventing

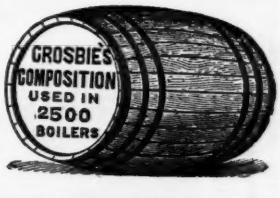
BOILER INCRUSTATION.

Absolutely Harmless and free from Acids.

ADOLPHE CROSBIE,

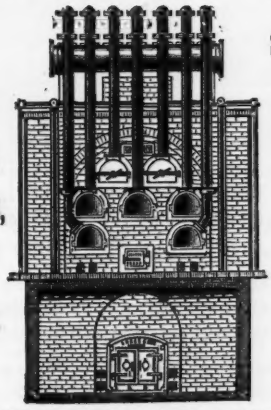
Chemical Works, Wolverhampton.

Crosbie's Paints for Gas-Works. Economical and Durable.



JONAS DRAKE & SON,

GAS ENGINEERS, CONTRACTORS, IRONFOUNDERS, RETORT SETTERS, ETC.



SPECIALITIES IN CARBONIZING PLANT, GENERATOR & REGENERATOR FURNACES.

OVENDEN, HALIFAX.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND DISTRICT OFFICE: 22, TEMPLE ST., BIRMINGHAM—SOLE AGENT: A. C. SCRIVENER.

TELEGRAPHIC ADDRESS: "WIGAN BIRMINGHAM." TELEPHONE No. 200.

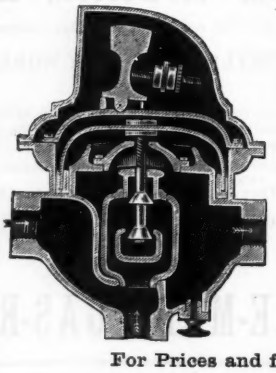
LONDON DISTRICT OFFICE: 6, STRAND, LONDON—C. PARKER & SON, SOLE AGENTS.

TELEGRAPHIC ADDRESS: "PARKER LONDON."

THE WENHAM AUTOMATIC GAS GOVERNOR

As supplied to and approved of by H.M. Government.

The most reliable Automatic Method of economizing Gas without reducing the Illuminating Power.



HUNDREDS ALREADY FIXED.

FLOOR WARMING STOVES

(LEEDS' PATENT).

CAN BE SUPPLIED FOR EITHER GAS OR OIL.

THESE STOVES ARE

CLEANLY, PORTABLE, ECONOMICAL,

And applicable for all kinds of Rooms where a Comfortable and Wholesome Atmosphere is desired.

For Prices and further Particulars, apply to the Manufacturers,

THE WENHAM COMPANY, LTD.,

UPPER OGLE STREET, FITZROY SQUARE, LONDON, W.

CLAPHAM BROTHERS, KEIGHLEY. ESTABLISHED 1837.

The most efficient Machine known for extracting Ammonia and other Impurities from Coal Gas, is

WELLINGTON, NELSON, & MARKET ST. WORKS.

Telephone No. 223.

Telegraphic Address: "CLAPHAM BROTHERS, Keighley."

Laycock and Clapham's Patent.

55 "Eclipse" Washer-Scrubbers, varying in capacity from 50,000 to 4,000,000 cubic feet per day, passing a total of 54,450,000 cubic feet of Gas per day, have been erected.

The Patent Wooden Balls thoroughly break up the Gas; give an immense amount of freshly-wetted Surface; and do not clog or increase back pressure.

Whilst the Gas is passing through and amongst the Balls, it is continually showered upon by the contents of Buckets.

The Shaft Revolves in Improved Bearings, and all Workings are accessible.

REPAIRS AND TROUBLE REDUCED TO A MINIMUM.

"YOU DON'T SAY SO!"

London: Printed by WALTER KING (at the office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, March 29, 1892.